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PAGE 22

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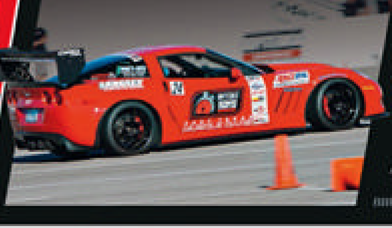

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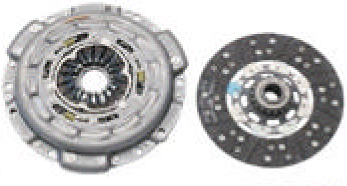

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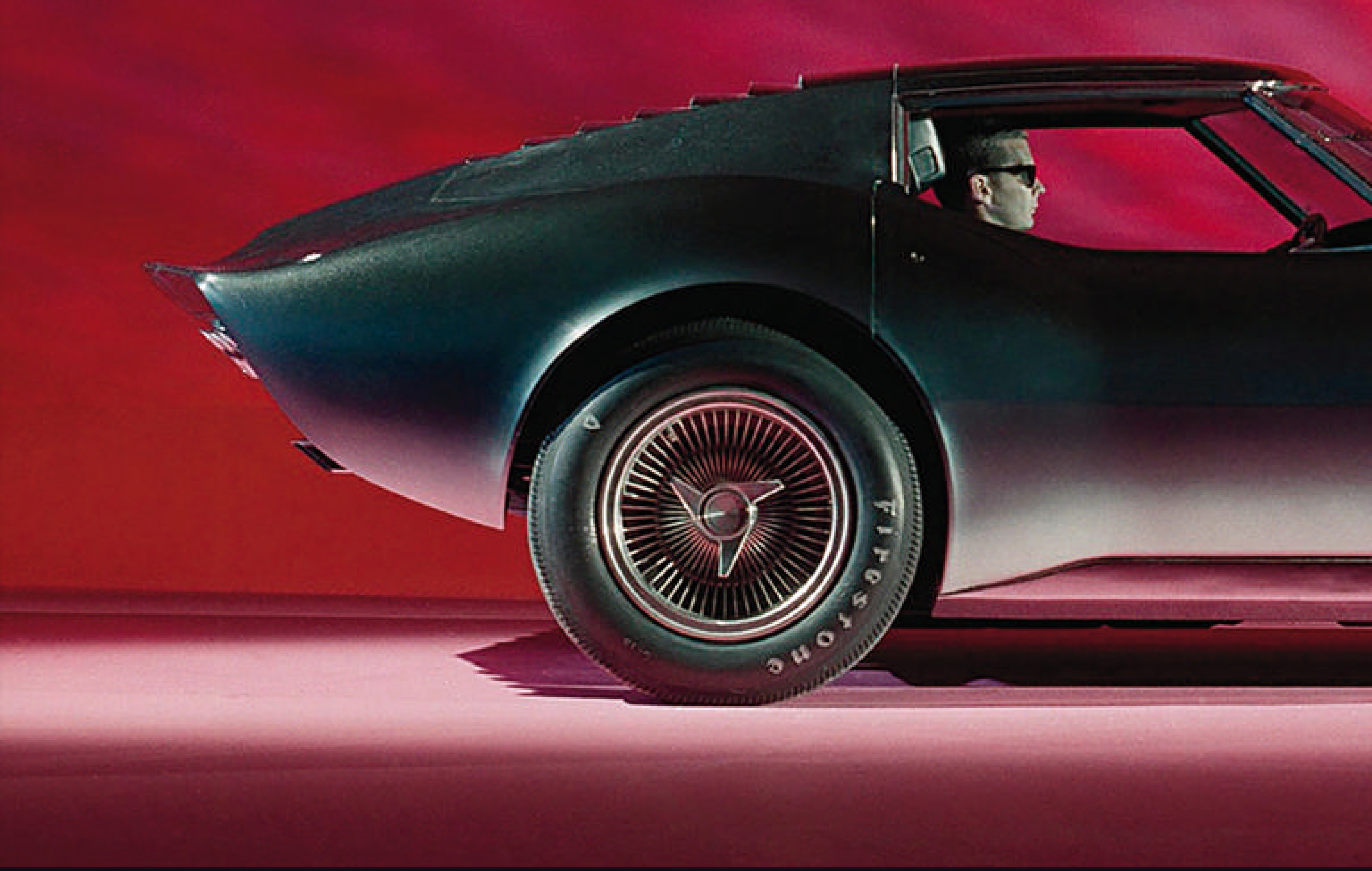

ON THE COVER

The only thing we love more than the performance of a modern Vette is the classic looks of the early years. Well, with today's aftermarket tidbits there's no reason you can't have both. One example is ***Bruce Ricks****' killer '62 shot by* ***Grant Cox****. It combines the best of everything into one sweet ride. We also dive back into our Prototypes and Concepts series and offer up a wide array of tech and lifestyle stories.*

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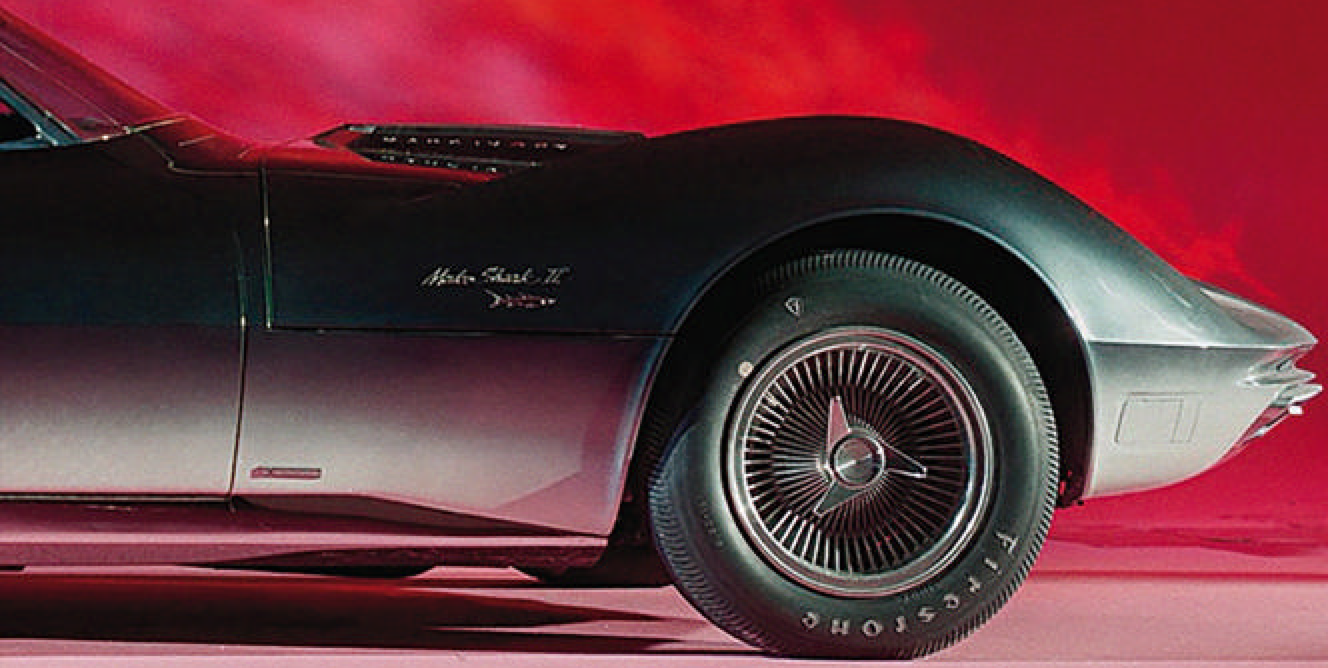

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In June of 1953, Chevrolet debuted America's answer to the European roadster—the sporty Chevy Corvette. From the moment it first rolled off the assembly line, this car was destined to become a classic. Since then, over 1.5 million Corvettes have been produced, giving it the record of the world's longest running passenger car in continuous production. With its streamlined look and powerful performance, its no wonder that the Corvette is considered America's iconic sports car!

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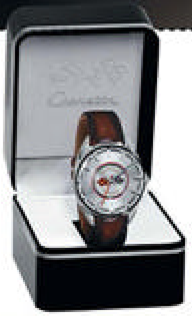

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IDLE CHATTER

STEVEN RUPP EDITOR

WHEEL TIME

Running this magazine is a whole lotta work, but there are quite a few perks. One of them is being invited by GM to come drive the "latest and greatest." This time it a was trip out to Spring Mountain Motorsports Park in lovely (not so much) Pahrump, Nevada, for some seat time in the new Z06. First off, I love the Spring Mountain facility and I was happy since I know the big track there fairly well. Of course, my plans were dashed a bit when I found out we would be driving on the smaller, newer track on the east side of the facility. I guess that makes sense since the Ron Fellows driving school would be going full bore on the main track. As an aside, I highly recommend their Corvette driving school.

Showing up, I was greeted by a lineup of new Z06 C7s in various colors and option levels. I was tossed the keys, I mean fob, to a sweet red, Z07 option Z06 and told to go cruise it thought the desert for a 100 miles. No problem!

First off, it doesn't cruise like you'd think a 650-horsepower supercar would. It's quiet, mellow, and well mannered, at least until you slap the gas the pedal. In fact, it's so quiet that when cruising the laser-straight desert highways I kept finding my speed creeping up into the forbidden zone. Yeah, I could see getting lots of tickets in this car. The problem is that it just wants to go fast and when it's going fast the Z06 is so drama free that you don't even notice.

Back at the track it was time to mash the throttle without any fear of jail, so I tossed on a helmet and jumped in a "fully loaded" Z07 model. Not wanting to be "that guy" and wad up, or otherwise mangle, a nearly new Z06 I eased into the laps, and even though I had a manual model I ran the course in mostly Third gear except at the top of the straights. After all, I was trying to learn the car (and the track), not win some nonexistent trophy. Lap after lap I kept finding out that I could push the car harder. The carbon brakes were insane, as in "I can't believe I'm waiting so long to brake." The LT4 felt great and had enough low-end grunt to easily pull me out of the corners and back up to speed. All I wanted was more laps so I could keep knocking my times down. But, after only eight laps it was over.

What did I learn? Well, that this car is better than I am a driver. That's more a compliment of the Z06 than an indictment of my driving skills. The Z06 rewards aggression and all the wiz bang computers work to save your backside when you push a little too hard. The rev matching is the best thing since sliced bread since it means there's one less thing that you need to worry about. Is the Z06 a track car or a street car? I would argue that it's both and that's a very good thing indeed. **VETTE**

> *WHAT DID I LEARN? WELL, THAT THIS CAR IS BETTER THAN I AM A DRIVER. THAT'S MORE A COMPLIMENT OF THE Z06 THAN AN INDICTMENT OF MY DRIVING SKILLS.*

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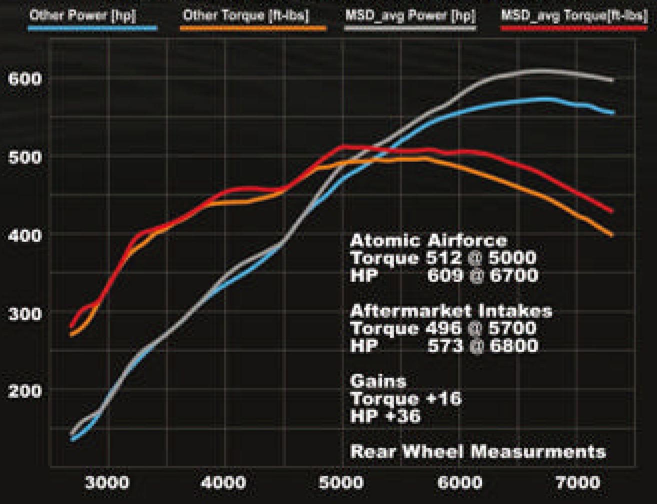

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FROM THE ARCHIVES

DREW HARDIN WORDS
TEN ARCHIVES PHOTOS

OVER ICE

Ray Brock must have loved Pikes Peak, as he covered the event for *Hot Rod* magazine for years.

"The thing that makes the Pikes Peak Hill Climb so interesting is the fact that it is completely unlike any other race held in this country or perhaps the world," he wrote to open his coverage of the 1960 event. The race starts at an elevation of 9,000 feet and climbs some 12.42 miles, making more than 150 turns—some tight switchbacks—to the finish line at 14,000 feet.

Today, the road up the Peak is completely paved, but for decades it was graded dirt. Competitors had to learn how to powerslide their way across the loose surface and around those turns, some perilously close to sheer drop-offs.

Adding to the challenge is the weather on the Peak. Despite the fact that the race takes place close to or on the Fourth of July, there can be huge differences in conditions between the two ends of the course. Crowds at the start line could be enjoying balmy sunny skies, while the finish-line crew might be enduring freezing rain or even snow.

The 10 days leading up to the 1960 race were warm and beautiful, Brock reported, but race day was something else. "Before the day was over, drivers and 10,000 spectators could truthfully assert that they had been through the wringer." Rain, sleet, and snow wreaked havoc on the roadway, while fog clamped visibility down to a minimum in places. "As if that weren't enough, lightning and wind were soon added to the list and weather reached proportions to stop even mail men. But the race was scheduled to run rain or shine, so the cars continued to fight their way up the mountain."

By the time the final class, for unlimited sports cars, was ready for its assault on the Peak, "all but about the first two miles of the road were completely blanketed in several inches of sloppy hail, snow, and mud," wrote Brock. That's why Charlie Bryant's '60 Corvette looks like it's competing in some sort of mud-bog race. Given the conditions it had to be a miserable drive. But Bryant managed to claw his way to the top in 19 minutes, 54.4 seconds, four minutes off the class record but fast enough to win the class. **VETTE**

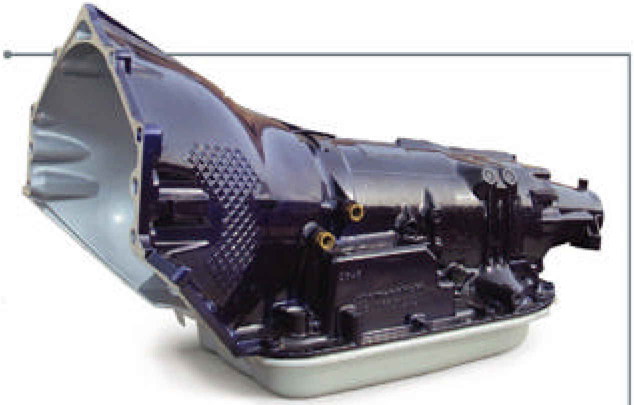
> TODAY, THE ROAD UP THE PEAK IS COMPLETELY PAVED, BUT FOR DECADES IT WAS GRADED DIRT. COMPETITORS HAD TO LEARN HOW TO POWERSLIDE THEIR WAY ACROSS THE LOOSE SURFACE AND AROUND THOSE TURNS, SOME PERILOUSLY CLOSE TO SHEER DROP-OFFS.

PRODUCT PREVIEW

ALL-SEEING EYE

Remember how AM radio stations went silent when driving through a tunnel? Ordinary GPS works fine until one pulls alongside a semi rig or drives under an overpass and then it's AM radio flashback. Highly advanced electronics and software design allow Dakota Digital's GPS-50-2 GPS Speedometer to work unlike anything else; internal accelerometers and predictive software compensate for times when GPS inherently struggles: overpasses, mountains, tunnels, heavy tree cover, large buildings, passing large vehicles, etc. The GPS-50-2 does such a tremendous job of rendering the correct speed information, it can be used to feed an aftermarket cruise control system; while not an easy task for a GPS speed sensor.

When used in conjunction with a Dakota Digital VFD3 or VHX Instrument system, a single data cable adds accurate speed information, compass heading, altimeter data, and clock syncing, all with fully automatic calibration; no DIP switches, no guessing. Outside air temperature can easily be added with an optional sensor. Find out more at **dakotadigital.com** or by calling 800.852.3228.



STREET SMART

Performance Automatic has expanded and upgraded its GM 4L80E Street Smart Transmission line. They are now offering five- and six-speed versions of this rugged unit. The new Pro Shift five- and six-speed transmission packages are available for most GM small- and big-block engines. If one needs the flexibility of a five-speed automatic tranny, Performance Automatic offers it in two different power levels. The five-speed Pro Shift version also has electronically controlled engine braking. Performance Automatic's Quik Connect Program is also included with five- and six-speed Pro Shift transmission packages. For more info visit **performanceautomatic.com** or call 240.439.4650.

COOL RUNNINGS

Old Air Products recently announced a new Evaporator Conversion Kit for '73-'77 Corvettes. This kit eliminates the troublesome VIR (valve in receiver) assembly and updates the A/C system to an accumulator/orifice tube type system like those found on later model Corvettes. This evaporator conversion works very well when updating the A/C system for 134a refrigerant. The kit includes a new evaporator, accumulator, orifice tube, hose assembly, and pressure safety switch. Kit part number 50-0073 fits '73-'76 Corvettes with GM A6 compressor and kit part number 50-0076 fits '76-'77 Corvettes with R4 compressor. To get the full scoop call 817.531.2665 or visit **oldairproducts.com**.

BADASS BEARING

Ram Clutches has created a new hydraulic release bearing kit to accommodate the coupling of the Tremec TKO transmission with a dual-disc clutch/flywheel assembly to Chevrolet small- and big-blocks. It works well in most GM applications, including those with taller single-disc units. Check out **ramclutches.com** or call 802.788.6034 for more info.

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TECHNICALLY SPEAKING

JAMES BERRY CORVETTE TECH GURU

THE NEED FOR SPEED UNDER CONTROL

DIAGNOSING CRUISE CONTROL PROBLEMS

Q: Hi James. I'm so happy to have the tech column in *Vette.* It has helped me so many times. I'm in need of some advice on my cruise control. It was working fine until I replaced the battery terminal ends due to corrosion. I love driving my Corvette on the open road when the weather is nice and I use the cruise control to keep out of trouble if you know what I mean. Is there any way I can diagnose the problem myself?

Thanks for your help,
Chris

A: Hi Chris, and yes, you can diagnose this problem yourself. I have had a lot of questions on how to diagnose and repair cruise control for all different generations of the Corvette. Since you did not include the year of your car we will discuss how to diagnose and check the components that will cover most of the cruise controls on the earlier generations of the Corvette.

The easiest way to diagnose would be by using a scanner. If you don't happen to have one of those there is an "old-school way" to figure out your problem. It is very common to have cruise control issues after changing a battery because the movement of sliding the battery in and out of the tray can cause the vacuum lines of the cruise control servo to dislodge or break. Since you only replaced the terminal ends, and assuming there wasn't much movement of the battery, we will have to go old-school and start from what I call the "jumping off point." Basically, we have to begin somewhere so let's start at the most common element, the cruise control servo.

Examine the vacuum lines to ensure that they are intact and not leaking. The photo at the beginning of the article shows the most common failure of cruise control systems, vacuum hoses that are leaking or deteriorated to the point they will not stay attached to the cruise control servo. If you don't find any problem there we will need to search a little deeper. Since we jumped off at the most common failure—vacuum lines—let's back up and test the fuses with a test light. I always recommend testing all of the fuses at this time, not just the ones related to cruise control. Sometimes you will find fuses feed multiple components that may not have been listed in the owner's manual.

First, turn the key to the On position. Probe the back side of each fuse. There are two places on the back side of each fuse to probe; if the test light does not light on both sides of the fuse you will find that the fuse is most likely blown. If the test light does not light on either side of the fuse; you will need to look in the owner's manual to see what that circuit feeds. Certain circuits will require that you activate something to illuminate the test light, such as turning the headlamp switch on to energize that particular fuse. If all of your fuses check good we will continue down our pathway of the cruise control system.

Our next step would be to make sure the servo operates freely. The cruise control system operates a mechanical linkage to the throttle body by using a vacuum motor called the cruise servo. This servo has a diaphragm that is moved when vacuum is applied to one side. There are two solenoids located inside of the servo. One solenoid connects the vacuum motor to the vacuum tank and allows for more throttle position. The other solenoid vents the vacuum to reduce throttle position.

While squeezing the diaphragm with your hand, you can watch the throttle open and close, and the cable should move freely with no binding or tight spots. If you see any restrictions or binding, we know the cable or its attachment point is the culprit. If all is working properly our quest continues.

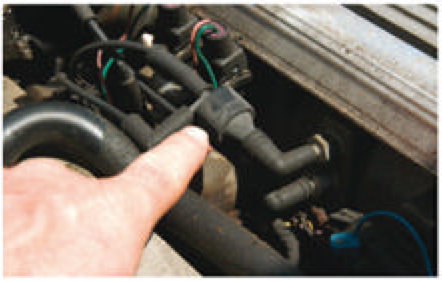
There are two hoses going into the cruise servo, the smaller hose is a vacuum supply and the larger hose is the dump hose. First, check the vacuum supply hose using a vacuum gauge. It should read between 15-20 inches of vacuum at idle. If not, check the supply hose for a leak. This hose originates from the intake manifold.

Feeding just off of the intake manifold you will find a solid black or a black and white vacuum check valve with two or three ports. This is a one-way check valve that prevents loss of vacuum to the air-conditioning controls and cruise servo when the manifold vacuum drops under acceleration.

To test the check valve, remove the valve from the hose and apply vacuum on the port closest to the intake. It should not hold the vacuum applied. Next, apply vacuum to one

➔ QUESTIONS?

Got a question for our Tech Corner expert? Just jot it down on a paper towel or a lightly soiled shop rag and send it to us at *VETTE* Magazine, Attn: Technically Speaking, 1733 Alton Parkway, Suite 100, Irvine, CA 92606. Alternatively, you can submit your question via the Web, by emailing it to us at vette@enthusiastnetwork.com. Be sure to put "Technically Speaking" in the subject line.



of the smaller ports and cover the other small port with your finger, it should hold vacuum. Remember, vacuum hoses and check valves can deteriorate and become brittle with heat and age. This is a very common problem.

If the vacuum supplied is good then we need to check the operation of the dump hose. Use a vacuum pump to apply vacuum to the dump hose to approximately 15 inches, and then press on the brake pedal. The vacuum should be dumped and the gauge should read 0. If the vacuum is not dumped we will need to check for a pinched vacuum hose or a faulty or out of adjustment brake vacuum-control switch.

If vacuum is getting to the servo and can be dumped, check to see if you are getting power to the servo. While placing your hand on the servo, have someone turn on the ignition and turn the cruise control switch to the On position. You should hear and feel the solenoids in the servo click. This lets you know the switch is working and that you have power to the servo. If you did not hear or feel a click in the servo, you will need to check to see if you are getting voltage to the servo itself. Disconnect the connector at the servo and connect a multimeter—on most systems—between terminals B and D. It should read approximately 8 volts.

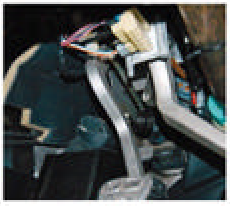
If you are not reading 8 volts between terminals B and D—with the key and cruise control in the On position—have someone release the steering tilt arm and move the steering column up and down slowly. If you are reading an intermittent voltage on the multimeter, the wiring from the cruise control engage switch could be broken in the steering column. This is a problem that can be caused from the wires becoming brittle with age. Then, as you use the tilt steering wheel feature the wires naturally bend as the column is tilted, causing the aged wires to break. So, as the tilt column is moved up and down, the frayed wires can make contact at times.

If you think you are having a solenoid problem inside the cruise control servo there is a "no tools required" test you can perform at this point. It is to simply pull the servo vacuum pod and cover the two vacuum ports with one finger, then push another finger against the dump servo plunger. As long as your finger is on the dump servo plunger the diaphragm should hold until you remove your finger. If the diaphragm will not hold, there is an internal leak in the servo or the diaphragm and the servo will need to be replaced, unless the plunger and a pin inside of the dump servo are stuck. Make sure they move freely and are not stuck. No problem found? Our trek continues.

Using a multimeter, check the resistance of the solenoids inside of the servo to make sure they are operating properly. The following will work on most C3 and C4 servos. The connector will be labeled A, B, C, D, E. Unplug the connector. Remember, you will need to refer to it for the correct alpha locations at the servo.

1. Check the resistance between pin A and C. It should be somewhere between 30 and 50 ohms.
2. Check the resistance between pin C and E. It should be somewhere between 30 and 50 ohms.
3. Check the resistance between pin B and D. It should be somewhere between 10 and 30 ohms.

If any of the resistance readings fall out of range, a defective solenoid should be suspected and the servo will have to be replaced.



If all of the above test out OK, check to see if the brake switch is out of adjustment. A quick way to diagnose this is to try holding the brake pedal up with the top of your left foot at the same time as you are engaging the cruise control while on a test drive. If the cruise control tries to set, then the brake switch will most likely need to be adjusted.

Adjustment of the brake switch is very common. If your Corvette has a manual transmission you have a clutch switch that has the ability to disengage the Cruise Control. This switch can be tested in the same way as the brake switch. To adjust the brake pedal switch, simply depress the brake pedal fully. Insert the brake pedal switch until it seats on its bracket. You will hear it click as you are inserting it into its bracket. After inserting the switch fully, pull the brake pedal back against its stop, you will hear the switch click into its correct position. Reconnect the brake switch electrical connector and vacuum hose (if equipped). Have someone check your brake lamps for correct operation before you go on a test drive.

If you suspect that the brake switch may be faulty you can use a test light to probe both sides of the switch. If the light only illuminates on one side or the other, or both sides light up, this is OK. (This switch can be a commonly open or commonly closed switch.) Now, depress the brake pedal and perform the same test. You should have the opposite reaction. If one side lit up and the other didn't on the first test, with the pedal depressed both sides should illuminate. If both sides illuminated on the first test but when the pedal is depressed only one side should illuminate. If there was no change at all, then the brake switch should be replaced. If when you began the first test and have no illumination at all, check for a blown fuse or an open circuit between the fuse box and the brake light switch.

OK, we have made it this far, and if your cruise control and speedometer are still not working; the Vehicle Speed Sensor (VSS) could be the problem. The vehicle's speed sensor, which is mounted on the output shaft of the transmission, sends electrical pulses to the computer. These pulses are generated by a magnet spinning past a sensor coil. As you increase the speed of the vehicle, the frequency of the pulses increases. Usually, if this sensor has failed it will leave a fault code 24 in the Engine Control Module (ECM). These codes can be retrieved using a scanner or a simple paper clip.

Good luck, Chris. This completes our journey of the cruise control system. I like to use the phrase "jumping off point" to get to the root of the problem. You have to start somewhere so you pick a place to start and then follow that part from beginning to end or until you find the cause of the problem. It involves multiple steps but it gives you a thorough inspection of all elements of the system you are checking. I hope you find the problem with your cruise control. **VETTE**

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7 FUNCTION DIGITAL MULTIMETER

ITEM 90899
98025/69096

Item 90899 shown

$14.99 VALUE

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12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

CHICAGO ELECTRIC POWER TOOLS

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SAVE $165

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POWDER-FREE NITRILE GLOVES PACK OF 100

HARDY

- 5 mil. thickness

Item 68498 shown

YOUR CHOICE!

$6.49

REG. PRICE $11.99

MEDIUM
LOT NO. 68496
61363/97581

LARGE
LOT NO. 68497/61360

X-LARGE
LOT NO. 68498/61359

SAVE 45%

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NEW

VEHICLE POSITIONING WHEEL DOLLY

PITTSBURGH

- 1250 lb. Capacity

LOT NO. 67287
61917/62234

$59.99

Item 61917 shown

REG. PRICE $109.99

SAVE $50

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WOW SUPER COUPON!

90 AMP FLUX WIRE WELDER

SAVE $50

CHICAGO ELECTRIC WELDING

- No Gas Required

LOT NO. 68887 61849

Item 68887 shown

WE CARRY A FULL LINE OF WELDING WIRE

$99.99

~~$109.99~~

REG. PRICE ~~$149.99~~

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SUPER COUPON!

RAPID PUMP® 3 TON LOW PROFILE HEAVY DUTY STEEL FLOOR JACK

SAVE $90

PITTSBURGH AUTOMOTIVE

LOT NO. 68049/62326
60688/61253/61282

Item 61253 shown

20"

$79.99

REG. PRICE $169.99

- Weighs 77 lbs.

63796997

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WOW SUPER COUPON!

SAVE $300

12,000 LB. ELECTRIC WINCH WITH REMOTE CONTROL AND AUTOMATIC BRAKE

LOT NO. 68142/61256/60813/61889

Item 68142 shown

BADLAND

$299.99

~~$399.99~~

REG. PRICE ~~$599.99~~

63747668

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SUPER COUPON!

27 LED PORTABLE WORKLIGHT/FLASHLIGHT

LOT NO. 67227
69567/60566/62532

SAVE 62%

Item 67227 shown

Requires three AAA batteries (included).

$2.99

REG. PRICE $7.99

63751005

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WOW SUPER COUPON!

SAVE OVER $187

US GENERAL PRO

30", 5 DRAWER TOOL CART

$162.78

- 704 lb. Capacity

LOT NO. 95272 69397 61427

~~$189.99~~ REG. PRICE ~~$349.99~~

Item 95272 shown

63722942

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SUPER COUPON!

1000 LB. CAPACITY ENGINE STAND

CENTRAL MACHINERY

SAVE 37%

Item 32916 shown

LOT NO. 32916
69886/69520

$49.99

REG. PRICE $79.99

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SUPER COUPON!

2.5 HP, 21 GALLON 125 PSI VERTICAL AIR COMPRESSOR

CENTRAL PNEUMATIC

Item 67847 shown

LOT NO. 67847
61454/61693

SAVE $70

$149.99

REG. PRICE $219.99

63758042

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SUPER COUPON!

SAVE 61%

CENTRAL PNEUMATIC

HIGH SPEED METAL SAW

LOT NO. 91753/60568/62541

Item 91753 shown

$12.99

REG. PRICE $33.99

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WOW SUPER COUPON!

- 70 dB Noise Level

4000 PEAK/3200 RUNNING WATTS 6.5 HP (212 CC) GAS GENERATORS

PREDATOR GENERATORS

SUPER QUIET

Item 69676 shown

SAVE OVER $208

LOT NO. 69676/69729

LOT NO. 69675/69728 CALIFORNIA ONLY

$291.78

~~$339.99~~

REG. PRICE ~~$499.99~~

63771353

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SUPER COUPON!

HaulMaster

72" x 80" MOVER'S BLANKET

LOT NO. 66537
69505/62418

Item 66537 shown

SAVE 66%

$5.99

REG. PRICE $17.99

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WOW SUPER COUPON!

20 TON SHOP PRESS

- Pair of Arbor Plates Included

CENTRAL MACHINERY

SAVE $145

LOT NO. 32879/60603

$154.99 ~~$199.99~~

Item 60603 shown

REG. PRICE ~~$299.99~~

63846196

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SUPER COUPON!

PITTSBURGH

6 TON HEAVY DUTY STEEL JACK STANDS

LOT NO. 38847
69596/61197/62393

Item 38847 shown

SAVE 50%

$39.99

REG. PRICE $79.99

63883918

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SUPER COUPON!

10 FT. x 17 FT. PORTABLE GARAGE

SAVE $120

HFT

$179.99

Item 69039 shown

REG. PRICE $299.99

LOT NO. 69039
60727/62286

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SUPER COUPON!

CEN-TECH

AUTOMATIC BATTERY FLOAT CHARGER

LOT NO. 42292
69594/69955

SAVE 70%

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$5.99

REG. PRICE $19.99

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SUPER COUPON!

AIR ANGLE DIE GRINDER

LOT NO. 32046/69945/62439

Item 32046 shown

SAVE 50%

CENTRAL PNEUMATIC

$9.99

REG. PRICE $19.99

63833925

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SUPER COUPON!

40 PIECE 1/4" AND 3/8" DRIVE SOCKET SET

- SAE and Metric

PITTSBURGH

LOT NO. 47902
61328

SAVE 60%

Item 47902 shown

$3.99

REG. PRICE $9.99

63842730

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WOW SUPER COUPON!

PITTSBURGH

1000 LB. CAPACITY MOTORCYCLE LIFT

LOT NO. 69904/68892

$299.99

SAVE $400

Item 68892 shown

~~$429.99~~

REG. PRICE ~~$699.99~~

63854754

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SUPER COUPON!

44", 13 DRAWER INDUSTRIAL QUALITY ROLLER CABINET

LOT NO. 68784
69387/62270

SAVE $340

US GENERAL

- Weighs 245 lbs.

Item 68784 shown

$359.99

REG. PRICE $699.99

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SUPER COUPON!

1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

drillmaster

LOT NO. 96289
62340/62546

SAVE 70%

Item 96289 shown

$8.99

REG. PRICE $29.99

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SUPER COUPON!

6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINES

Item 69727 shown

PREDATOR ENGINES

LOT NO. 60363/69730/68120

LOT NO. 69727
CALIFORNIA ONLY

SAVE $150

$99.99

REG. PRICE $249.99

63886406

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WOW SUPER COUPON!

CENTRAL PNEUMATIC

110 LB. PRESSURIZED ABRASIVE BLASTER

$89.99

~~$129.99~~

SAVE $160

REG. PRICE ~~$249.99~~

Item 60696 shown

LOT NO. 69724/60696
95014

63812611

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SUPER COUPON!

Haul Master

1195 LB. CAPACITY 4 FT. x 8 FT. HEAVY DUTY FOLDABLE UTILITY TRAILER

SAVE $140

LOT NO. 90154/62170

- DOT certified

Item 90154 shown

$259.99

REG. PRICE $399.99

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SUPER COUPON!

MECHANIC'S SHOP TOWELS PACK OF 50

Item 46163 shown

LOT NO. 46163
61878/69649
61837/68442

HFT

SAVE 50%

$9.99

REG. PRICE $19.99

63847219

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SUPER COUPON!

4 PIECE ANTI-FATIGUE FOAM MAT SET

HFT

LOT NO. 94635/61607
62389

SAVE 50%

Item 94635 shown

$7.49

REG. PRICE $14.99

- Each pad measures 25" x 25"

63881237

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WOW SUPER COUPON!

29 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL DRILL BIT SET

NEW

LOT NO. 5889/61637/62281

SAVE 60%

$9.99 ~~$19.99~~

Item 61637 shown

REG. PRICE ~~$24.99~~

WARRIOR

63824431

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SUPER COUPON!

20 GALLON PARTS WASHER WITH GENERAL PURPOSE PUMP

Item 7340 shown

LOT NO. 7340/60769/94702

CENTRAL MACHINERY

SAVE $45

$84.99

REG. PRICE $129.99

63810202

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WOW SUPER COUPON!

CHICAGO ELECTRIC WELDING

MIG-FLUX WELDING CART

SAVE 44%

Item 69340 shown

Welder and accessories sold separately.

$33.33

~~$49.99~~

REG. PRICE ~~$59.99~~

LOT NO. 69340/60790
90305/61316

63815173

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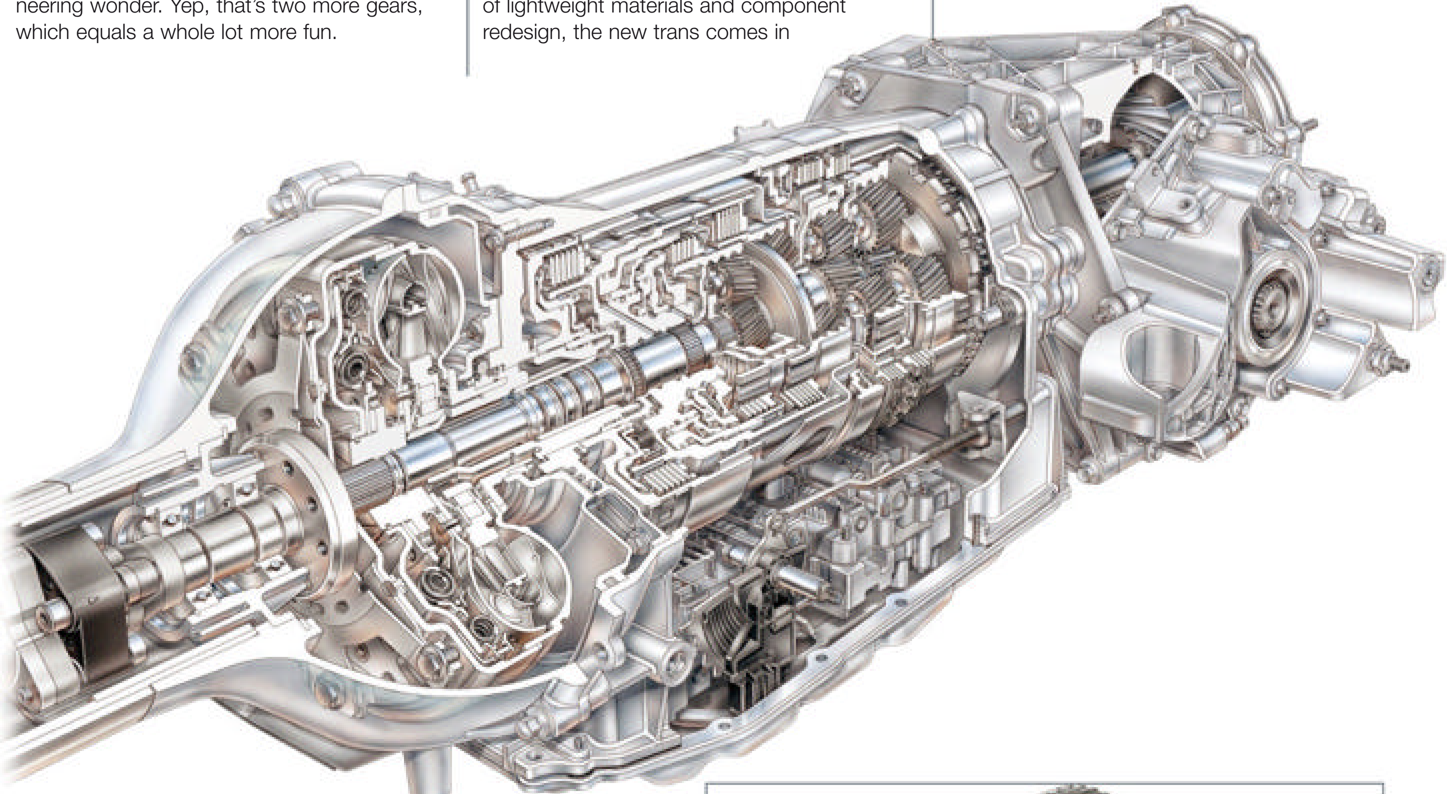
EIGHT-SPEED DREAM

GM'S NEWEST AUTOMATIC TRANSMISSION FOR THE C7 CORVETTE

STEVEN RUPP WORDS
GENERAL MOTORS PHOTOS

It seems the term "the more the merrier" is used quite often around GM these days. The '14 C7 brought us the first Corvette seven-speed manual transmission, and GM recently announced that they are plus-sizing the automatic as well. New for the '15 Corvette is the 8L90 Hydra-Matic paddle-shifted eight-speed engineering wonder. Yep, that's two more gears, which equals a whole lot more fun.

There are many interesting aspects to the new eight-speed auto, but the most amazing part is that it's the same package size as the old six-speed auto. This obviously saved GM a ton of trouble and expense since they didn't need to work over the C7 to get it bolted in place. The two extra gears didn't even add any weight. In fact, due to the extensive use of lightweight materials and component redesign, the new trans comes in eight pounds lighter than the outgoing six-speed. "GM's new 8L90 eight-speed automatic represents a rare win-win-win scenario for customers," said Kavoos Kaveh, global chief engineer for eight-speed automatic transmissions. "It offers greater performance and efficiency, while weighing less than the transmission it replaces. That's a



With four simple gearsets and five clutches (two brake clutches and three rotating clutches), creative packaging enables the new eight-speed automatic to fit the same space as the previous six-speed automatic. This architecture also features a turbine shaft node that reaches to the outside of the barrel, enabling the use of a high-resolution magnetic speed sensor. The turbine shaft itself is very short, keeping oil channel drill lengths to a minimum. The rotating clutches are located near the front of the transmission, with short oil feed channels, which translates to very fast shifts. Extensive use of aluminum and magnesium also make it more than eight pounds (4 kg) lighter than the previous six-speed automatic.

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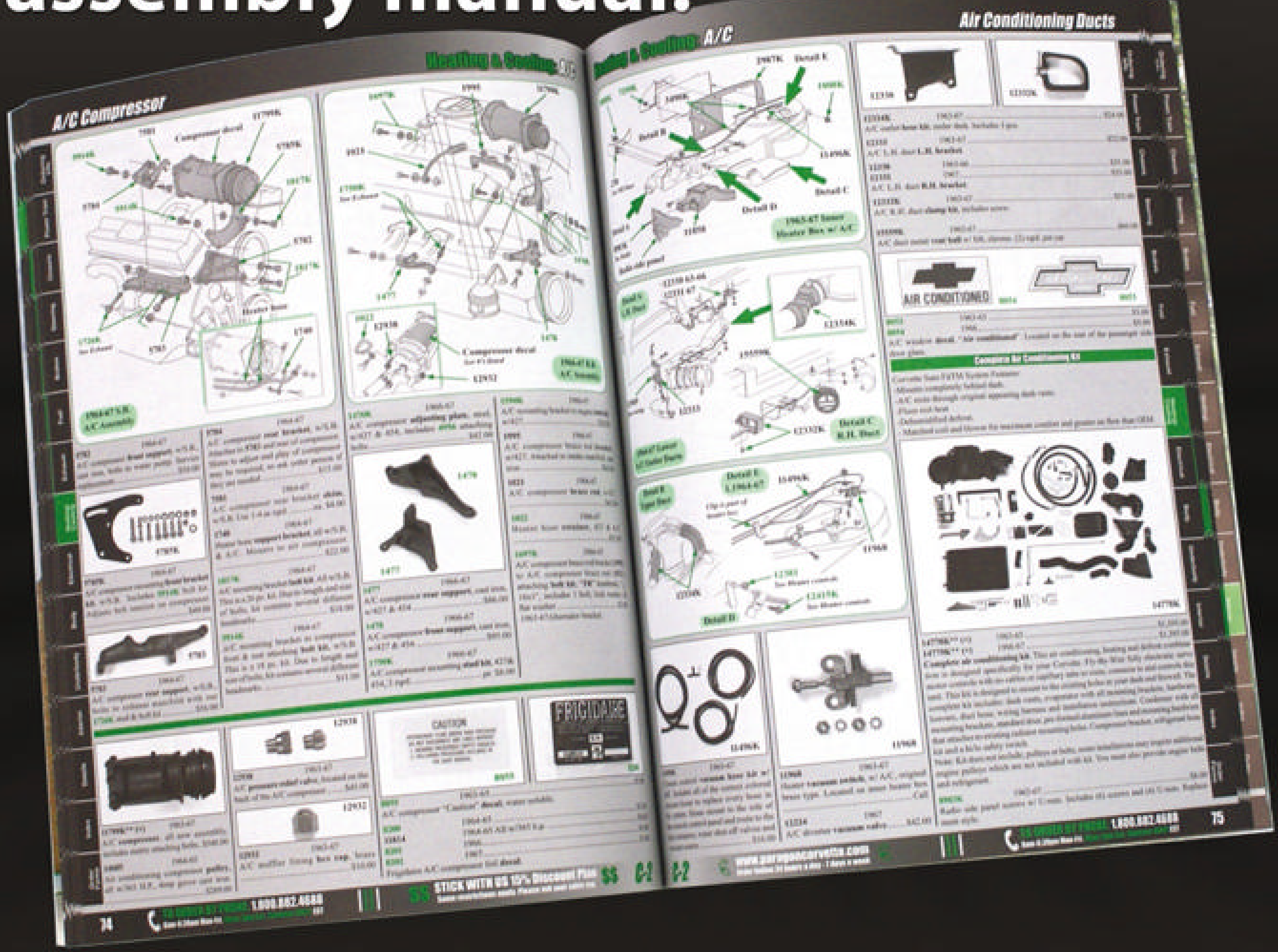

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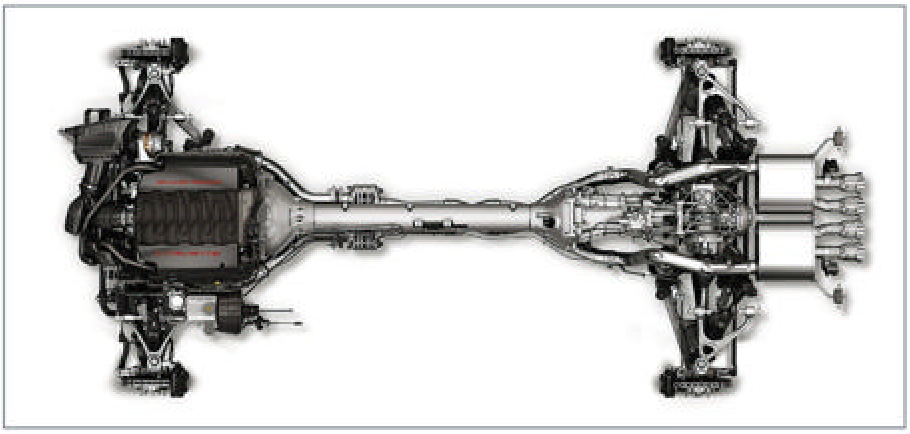
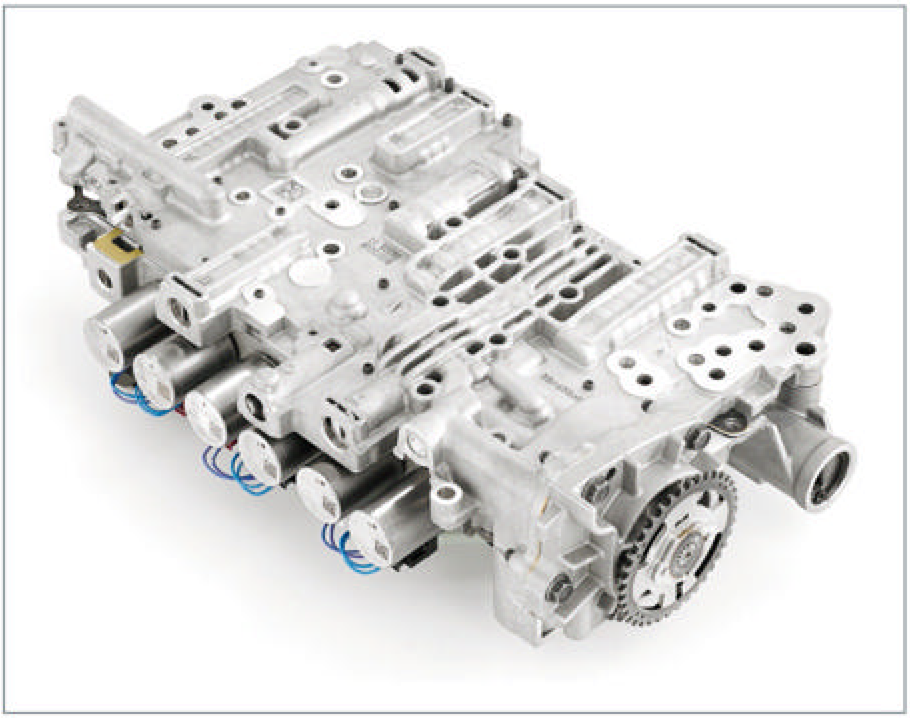
rare accomplishment in the industry today—and one for which GM has been awarded more than two dozen patents." Also, the extra gears were added more for performance than fuel economy, although mpg did go up a bit. So, now there are six "go" gears and two overdrives. This makes for a very close ratio setup and it allows the Vette to stay in the rpm sweet spot of the LT1 (or LT4 in the Z06) easier. In fact, most of the performance high-notes the new Stingray has achieved (including those of the new Z06) have been in automatic transmission cars, and not their manual trans-equipped cousins. **VETTE**

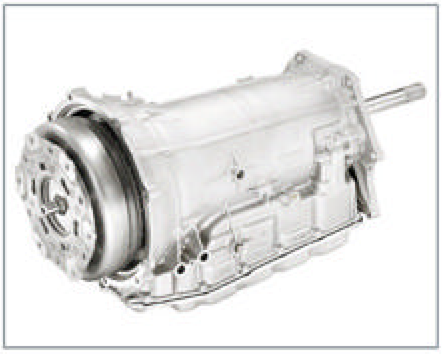


The top gear ratio is 0.65 vs. the six-speed's 0.67 ratio. Combined with a new, numerically lower 2.41 rear axle ratio in the Stingray vs. the 2.56 gear used with previous six-speed automatic models, engine rpm is reduced by 8 percent (123 rpm) on the highway at 70 mph. The lower engine speed reduces fuel consumption, while a new torque converter design enhances refinement, particularly during low-speed gear changes. Stingray models equipped with the Z51 Performance Package feature a more aggressive 2.73 axle ratio, while the Corvette Z06 features the 2.41 axle ratio.



A new Gen II transmission controller analyzes and executes commands 160 times per second, and wide-open throttle upshifts are executed up to 0.08 seconds quicker than those of the dual-clutch transmission offered in the Porsche 911. The greater overall performance and efficiency enabled by the 8L90 in the Corvette is due primarily to a new, wider 7.0 overall gear ratio spread, which enhances off-the-line performance with a more aggressive First gear ratio—4.56 vs. 4.03 on the six-speed—helping achieve the quicker 0-60 time.

Similar to GM's six-speed automatic design, the eight-speed's architecture locates the grounding clutches toward the rear of the assembly, outside of the gearsets. However, the grounding clutches are splined to the case, eliminating the center support, which further reduces weight.



For performance driving, the transmission offers full manual control via steering wheel paddles. A new transmission-control system and refined algorithms deliver shift performance that rivals the dual-clutch/semi-automatic transmissions found in many supercars—but with the smoothness and refinement that comes with a conventional automatic fitted with a torque converter. Thanks to a new torque converter clutch friction lining and a new control strategy, the 8L90's squashed torque converter uses conventional dual-path converter feeds. The architecture features a one-piece case with integral bellhousing for enhanced powertrain stiffness, as well as a detachable extension for the Corvette's rear transaxle arrangement.

An industry-first off-axis, chain-driven binary vane-type pump—located within the valvebody—effectively allows for two pumps in the packaging size of a single, which contributes to lower parasitic losses and optimal priming capability, as well as ideal oil routing to the controls system. The binary pump is located very low in the sump, for greater cold prime operation: as low as -40 F (-40 C) and excellent high-speed operation with stable line pressure. This is important in a car that can easily exceed 1 g lateral load.

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BRUCE RICKS' '62 LEAVES NOTHING ON THE TABLE

STEVEN RUPP WORDS
GRANT COX PHOTOS

Building a hot rod is a bit of a gamble and if your goal is to end up with something extra special then the risk is even more so. The best way to mitigate the risk is to have a solid plan in place, and that's where Bruce Ricks knocked it out of the park. You see, he felt a safe bet would be to go custom, but still respect the heritage and classic looks of his '62 Vette. But, it wasn't an easy journey going from driver to jaw dropper. As Bruce told us, "I bought the car from a guy in Texas that had found it in California where it was in the process of being turned into a drag car. All the trim had been pulled and discarded, but fortunately the body hadn't been messed with. That guy spent nearly four years finding new N.O.S. parts and putting the Corvette back together. I took me two years to talk him into selling me the car, and even then he almost backed out."

Now, the previous owner had done a nice job, but Bruce is a pretty picky guy. After all, he won the 2011 Ridler award with his ’56 Ford called Suncammer, so it shouldn’t be a shocker that he would want to make the Corvette his own. With that in mind, he decided to freshen up the Vette. But, as is often the case, that simple task became a rebuild of epic proportions.

After pulling the body from the factory frame and stripping it down to bare ’glass, his body shop, Cimtex Rods in Jarrell, Texas, found a host of issues, from previous crash damage to old, brittle fiberglass. It was a lot of work, but eventually they had a solid body to work with. Since they would be moving to a Vintage Air unit, the heater box could be ditched and the firewall hole fiberglassed over. They also spent a ton of time reworking the inner fenders for a cleaner look, and to fit the new Art Morrison chassis that became part of the build plan. The new chassis allowed for the use of larger tires, so the rear wheeltubs were heavily massaged to accommodate the 295/20 rear rollers. Once the body mods were finished, the team at Cimtex spent weeks getting every gap identical and the body laser straight. After a spray out of high-build primer and more block sanding the body was ready for a few coats of PPG black base and clear.

While the body was getting worked over, the chassis was also getting quite a bit of love. The Art Morrison Enterprises (AME) GT Sport chassis was coated in black and the front C6 control arms were smoothed out and shot in silver. A DSE power rack handles steering duties while RideTech coilover shocks tame the bumps. The rear suspension is an AME triangulated four-link with a narrowed Ford 9-inch with 3.50 gears. The rest of the rear consists of Strange Engineering axles, an Eaton posi, and another pair of RideTech coilovers.

Stopping the Corvette is left to a set of massive Baer 6P disc brakes with 14-inch rotors and enough piston area to create eye strain when put to hard use. Rolling around these binders are 18- and 20-inch Schott Performance billet wheels wrapped in Pirelli P Zero Rosso rubber.

Of course, without an engine the car would be nothing but garden art, so the team decided to stuff a cammed LS3 aluminum crate engine under the hood. Rated at 515 horsepower it would be more than enough to sling the ’62 down the highway. The only problem was that the LS engine is somewhat homely in its factory configuration. To remedy this style faux pas, the block was attacked with a series of sanding discs and rotary files until it was as smooth as butter before it was given a coat of red paint. They then turned their attention to the engine’s coil packs. For obvious reasons they couldn’t be ditched, and relocating them creates other problems. So the team turned to Greening Auto Company in Nashville, Tennessee, for a set of their trick billet covers. The upper section of the valve covers, that encases and hides the coils, was milled with fins and Corvette script for a more traditional look. To top the engine, Bruce contacted Kinsler for one of their trick cross-ram pieces. The assembly that arrived looked a

THE PROJECT WAS EVENTUALLY DUBBED “SIXTY-TWO TWELVE” SINCE IT WAS NOW A ’62 REFINED FOR 2012. IT’S A MIX OF THEN AND NOW THAT SHOULD HOLD UP WELL TO THE TEST OF TIME. SINCE HITTING THE PAVEMENT, IT’S WON A HOST OF AWARDS FROM BUILDER’S CHOICE TO BEST PAINT AND INTERIOR.

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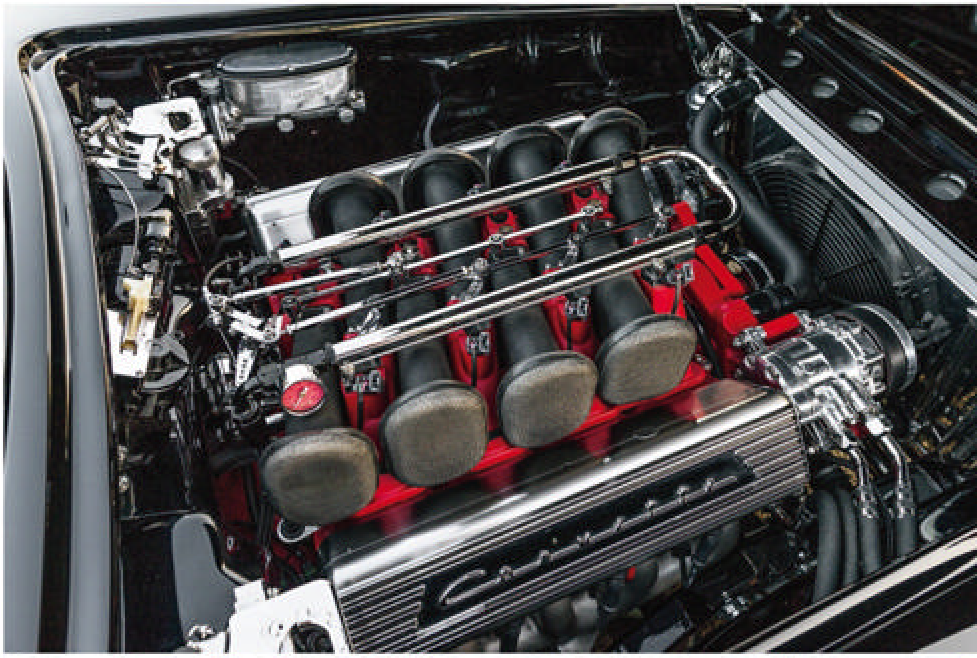
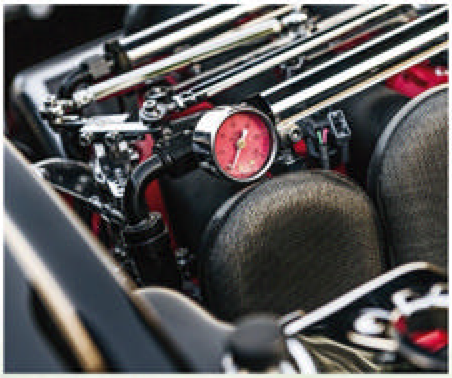
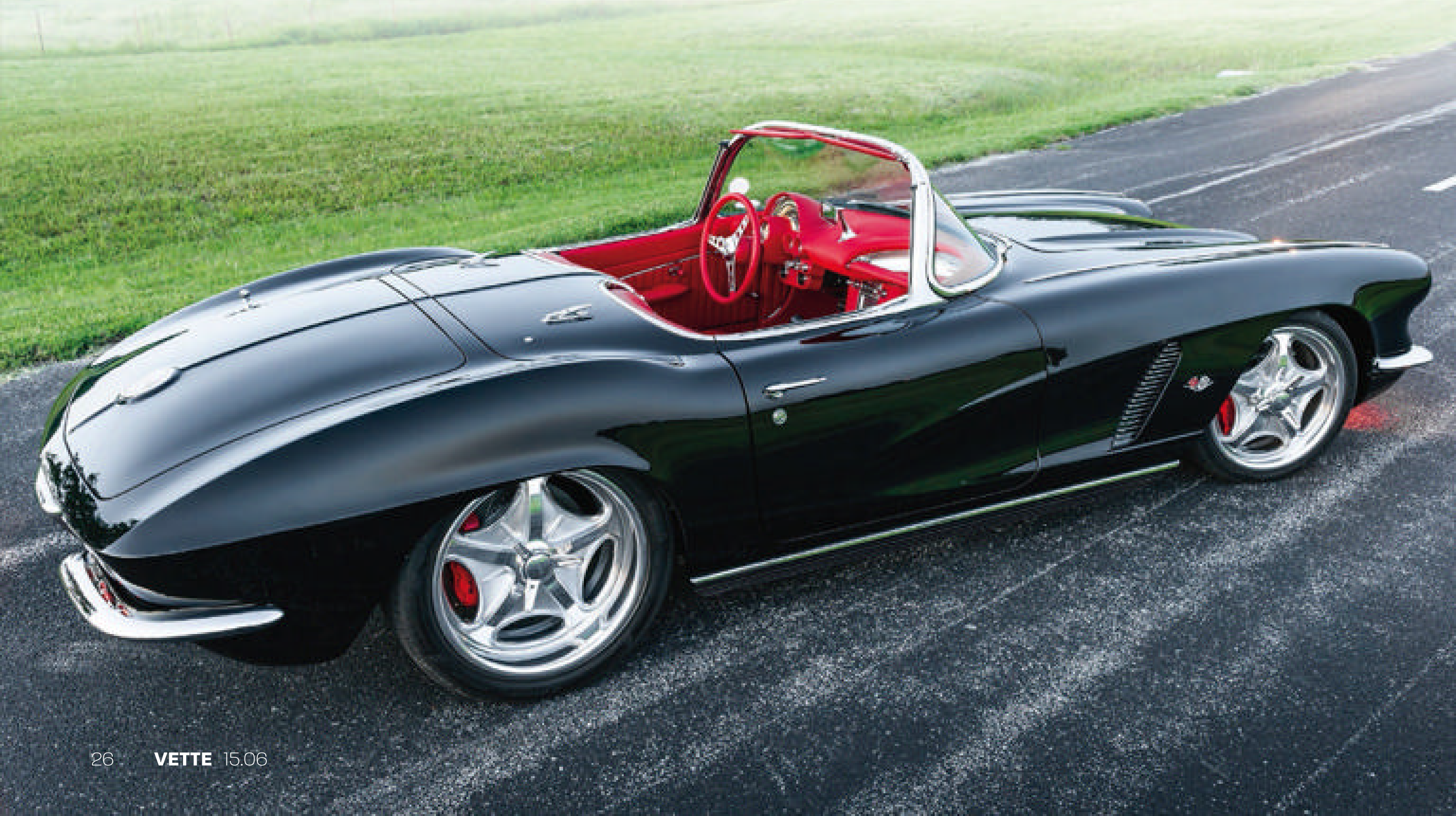
bit too high tech, so the intake was painted red, to match the block, and the carbon-fiber ram tubes were given a coat of black crinkle paint, popular in many '60's era engine bays. The Quicktime bellhousing and Richmond five-speed were ground smooth and painted in the same red. The result is a drivetrain that looks both modern and classic at the same time.

For the interior Bruce decided to stay closer to the Corvette's original design, but like the rest of the car he wanted it to be top shelf. To carry out his vision the Vette was shipped off to Gabe Lopez of Gabe's Custom Interiors in San Bernardino, California. The vinyl was tossed in the dumpster and rolls of red leather were slid into the project parts bin. A pair of adjustable, Al Knoch seat frames were modded to look similar to the stockers. The pleats were changed on the seatbacks to mirror the seat bottoms and the corners were rounded for a more modern vibe. The door panels look nearly stock, except they are wrapped in red leather and the lower carpeted area was ditched. Even the dash received more of the red leather treatment. To track the engine's vital signs a custom set of gauges was sourced from Classic Instruments. Even the steering wheel is custom, modified to be one-inch smaller in diameter compared to stock and wrapped in, you guessed it, more red leather.

The project was eventually dubbed "Sixty-Two Twelve" since it was now a '62 refined for 2012. It's a mix of then and now that should hold up well to the test of time. Since hitting the pavement, it's won a host of awards from Builder's Choice to Best Paint and Interior. But most of all it's been a blast to drive. Nice to see that the gamble paid off. **VETTE**







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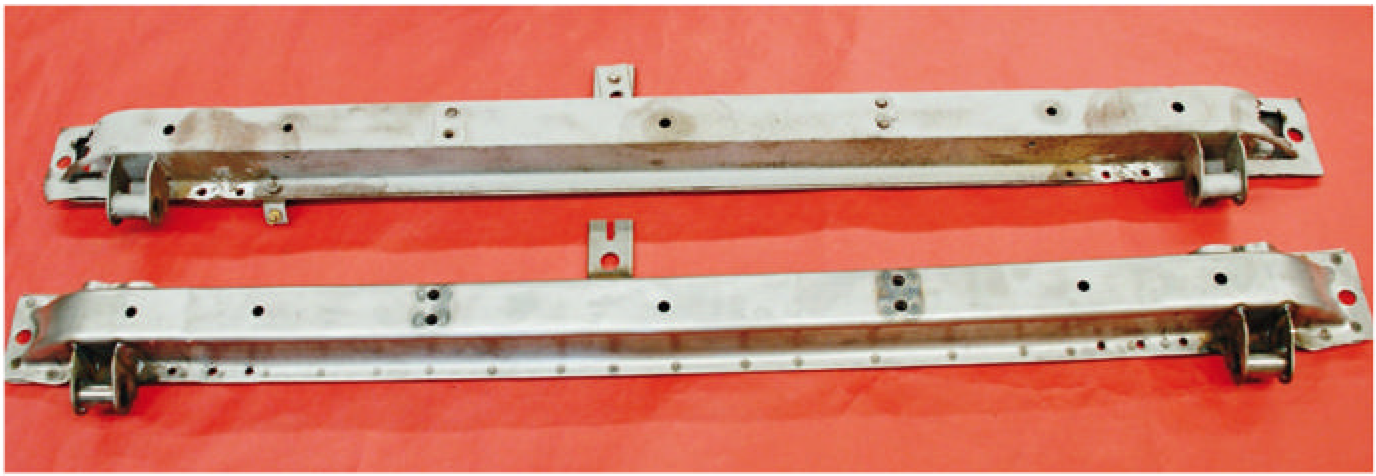
REPAIRING A C1 FRAME THE RIGHT WAY

GERRY BURGER WORDS | PHOTOS



01 **A side-by-side comparison shows the new Corvette Central crossmember (lower) is a perfect reproduction of the original. The new crossmember proved to be both the perfect fit and perfect repair for our '60 Corvette frame.**

02 **A temporary brace was fabricated to hold the framerails in position. First, we had to heat the bumper bracket plate to remove the broken bolts.**

After removing the body from the frame we discovered what would qualify as an average C1 chassis that has spent its life east of the Mississippi. This particular car was a southern Kentucky/Indiana car and to that end we found plenty of good ol' dirt bonded to the frame along with mostly surface rust with minimal pitting. Now, we say "mostly" because there were areas that required more than sandblasting to rid the rot.

One such area was the rear crossmember, which had typical outside corner rust-through. At first glance, a person might consider simply repairing the outside corners, but as we discovered that would be an inadequate repair. The only proper repair is to completely replace the rear crossmember, and while that may sound somewhat daunting, it is a fairly straightforward repair.

Unlike the new C7 chassis that is formed with 38 extrusions, 10 castings, 76 stampings, and 3 hydroformed parts, the C1 chassis consists of mild steel framerails with a basic center X-brace. The framerails are two-piece units seam-welded top and bottom. Rivets and welds hold the entire chassis together. The technology employed on the C1 chassis is much closer to a regular car frame from the 1940's than the new millennium.

While this low-tech frame may lack torsional rigidity and weigh considerably more than a modern Corvette chassis, things aren't all bad. The bad news is the frame needs repair; the good news is Corvette Central has a replacement crossmember and the repair can be done in a well-equipped home shop, something that can't be said about a C7 frame.

We began the frame repair with a trip to the local mediablaster where the frame was hydroglass blasted, basically glass particles mixed with water and blasted at high pressure. The result was impressive, all surface rust, dirt, grease, and grime were gone but the base material was not attacked. The blasting exposed suspect areas and showed complete rust-through in two places: the rear crossmember and the bottom of the "dog leg" on the passenger side.

We knew the rear crossmember was bad going in, so that was no surprise. We began the rear crossmember replacement process by first removing the complete rear suspension. Then, using a square, we scribed the front and rear location of the crossmember on the side rails. Next, we fabricated a temporary crossmember from 1-inch square tubing that bolts to the rear bumper mounts. This piece ensures the framerails can't move during the replacement process.

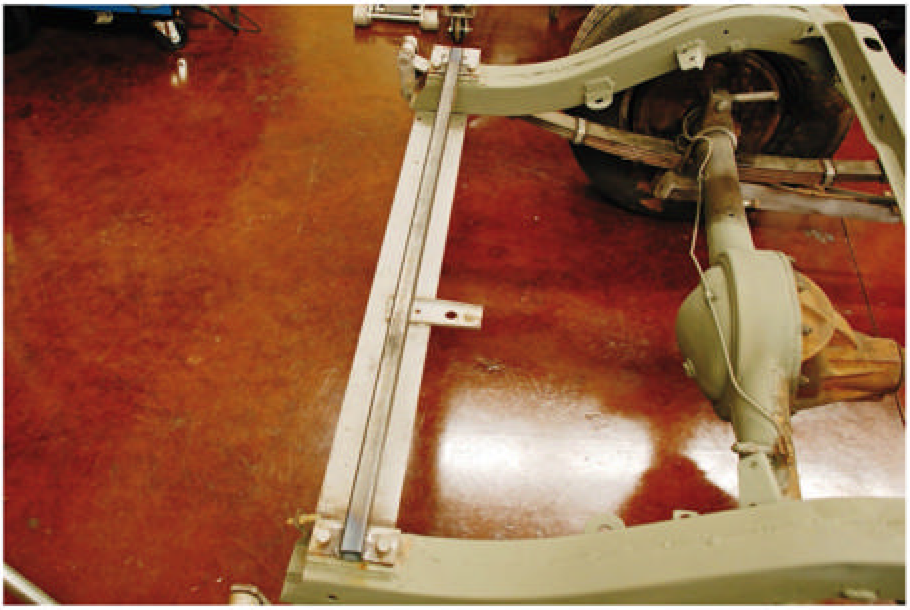
We began the removal process by using a die grinder with a cutoff wheel to remove the heads off the four rivets holding the rear crossmember in place. A hammer and punch removed the rivets. Next, using the same cutoff wheel we cut through the welds on the front and rear of the crossmember and finally removed the piece. It didn't take long to discover the rust-through between the crossmember and the framerail. The framerail was rusted completely through, as was the crossmember but fear not, the repair is Metal Working 101.

We did not want to lose the rivet holes as they are the initial locator holes for the new crossmember. With that in mind we fabricated a piece of 1/8-inch flat stock measuring 2 5/8x6 inches. The plate was clamped inside the framerail and a transfer punch located the two rivet holes on the rear of the new piece. We drilled two more holes on the front end of the plate and blind welded nuts to the bottom side. Corresponding holes were drilled in the frame so we now had four bolts securing the plate in position. The rusted area was cut out and cleaned up before we welded the plate in place. This provided us with a strong repair, but we still had to fabricate the step in the framerail so the new crossmember would rest squarely on the framerail. To that end a piece of 1 1/4x1/8-inch flat stock was cut to fit and welded in place. This was done to both sides of the framerail and we now had a structurally sound pair of framerails. We'd say they are "good as new" but actually the double thickness makes them better than new.

From here, locating and installing the new Corvette Central rear crossmember was quite simple. The key here is to take your time locating the crossmember. This piece is structurally very important since it is the rear spring mount, it must also be accurately located as it incorporates both suspension and body mounting points.

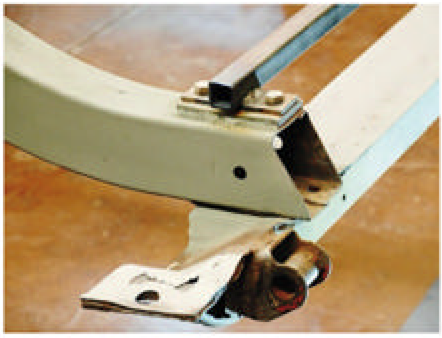
We loosely bolted the crossmember in place using the original rivet holes as locators. We took preliminary measurements diagonally and parallel with the framerails to locate the crossmember perfectly square to the outside framerails. We also measured in from the ends of the crossmember to the sides of the framerail. This ensures the crossmember is perfectly centered. Take your time with these measurements to ensure the proper location is achieved, then tighten the bolts on the rear rivet flange and clamp the front flange down.

Next, we tack welded the crossmember in place, double-checked our measurements and

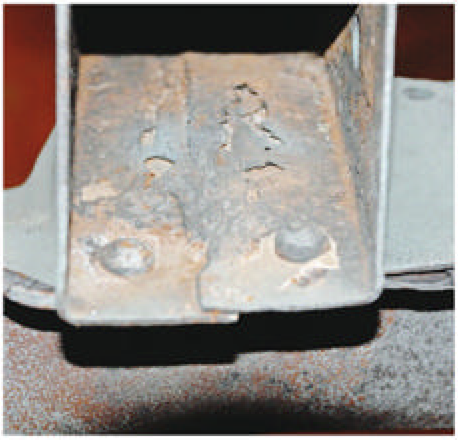


03 **The frame was sent off to be mediablasted and when we brought it home this temporary brace was fabricated from 1-inch square tubing and bolted in place to ensure the framerails don't move.**

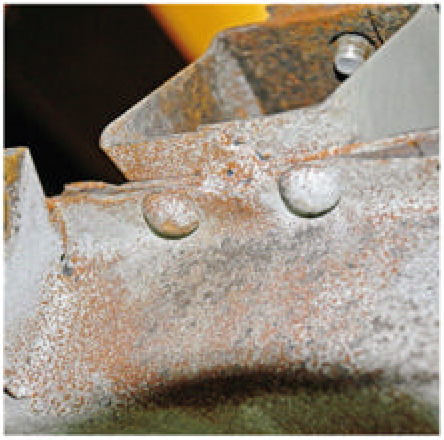
04 **The entire rear suspension was removed from the car since the rear crossmember also serves as the rear spring shackle mount. We then used two engine stands as a rotisserie to mount the frame to for a more comfortable working height.**



05 **With the spring shackle removed it is easy to see that the rear crossmember has completely rusted through in the lower portion and next to the body mount hole.**



06 **Looking inside the framerail it was obvious there was rust in the area, we were hoping for just some surface rust, but that was a dream. If your inner framerail looks like this, chances are you need a new rear crossmember.**

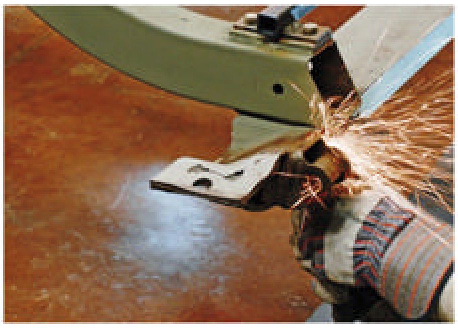


07 **These two factory rivets would provide the mounting and alignment holes for our new Corvette Central rear crossmember.**

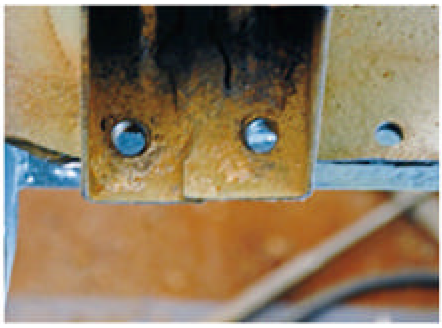
then completely welded the Corvette Central reproduction crossmember in place. When we ordered the crossmember from Corvette Central we also ordered the four rivets to provide a factory look to the installation. This would be all-important if we were doing a true restoration rather than our mildly modified build. Using a rivet gun and bucking bar we installed the rivets. It should be noted that due to our extra thick repair plate the rivets were just long enough to be expanded.

It is also worth mentioning the method used to weld the crossmember in place. If you are going for a true restoration, reproduce the factory welds as close as possible using either a stick welder or a MIG welder to run a series of 1- to 2-inch welds. A digital photo of the original welds would serve as a guide for your welding. Once again, we are doing a mildly modified chassis so we elected to TIG weld the entire perimeter of the crossmember where it meets the framerail. This provides a clean, strong weld and welding the entire seam prevents water from migrating between the frame and the crossmember. No water means no rust and we like that idea.

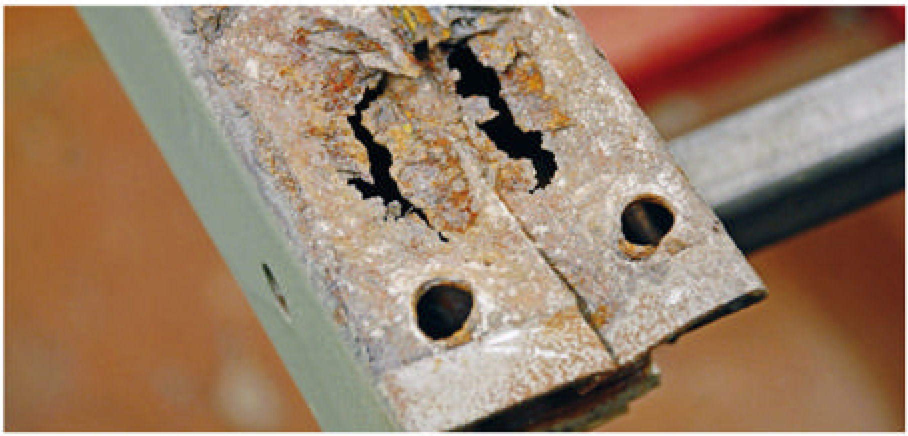
Replacing the rear crossmember in our C1 chassis with a Corvette Central reproduction crossmember turned out to be a nice weekend project. We're sure it could have been done quicker, but we like to take our time on critical repairs. Once again, this project is well within the reach of the average Corvette enthusiast with a well-equipped home shop. The Corvette Central parts fit flawlessly and we now have solid attachment points for our rear suspension and the rear body mounts. **VETTE**



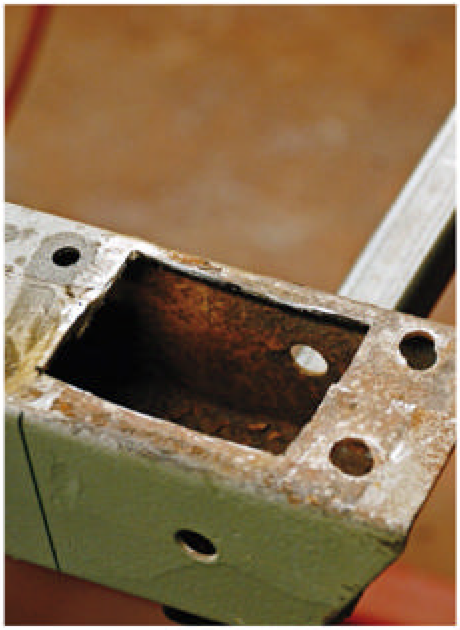
08 **We cut the heads off the two rivets with a die grinder and cutoff wheel. The same tool would slice through the factory welds to remove the original, rusted-out rear crossmember.**



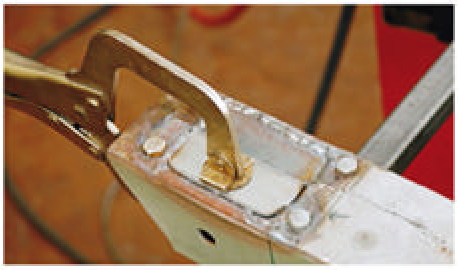
09 **A punch and a hammer knocked out the rivet shanks, leaving us a factory hole to utilize as a locator for the new crossmember.**



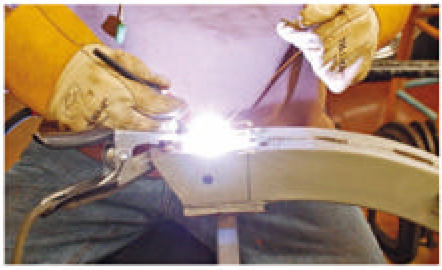
10 **Remember that little bit of rust inside the framerail? Well, trapped water between the crossmember and framerail caused complete rust-through on both the frame and the crossmember.**



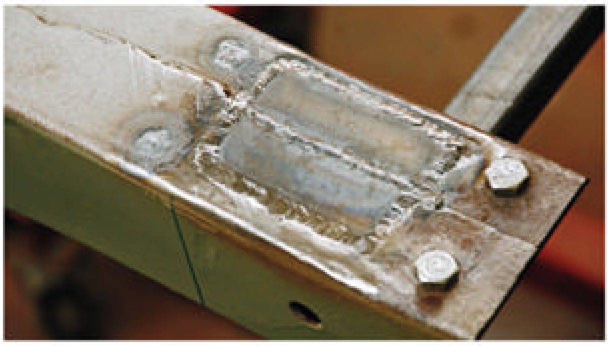
11 **This amount of rust would definitely compromise the strength of the frame, so we removed all the rotted area and, of course, had the new Corvette Central rear crossmember on hand too.**



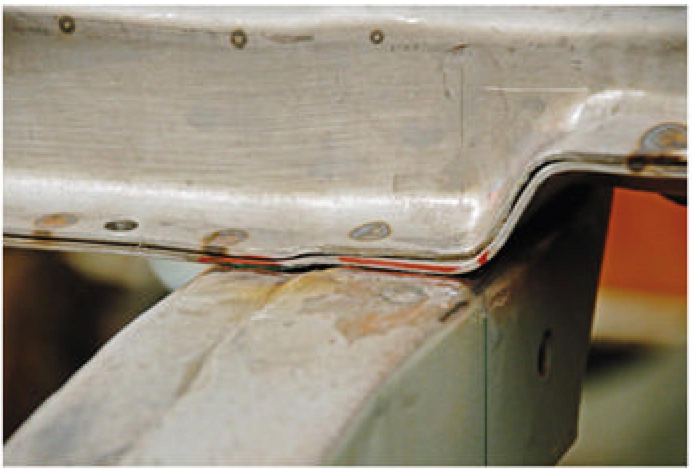
12 **We first welded a 2 5/8x6-inch plate to fill the hole, and then a 1 1/4x1/8-inch plate was used to form the step in the frame. The two bolts on the right hold the lower plate in place for welding.**



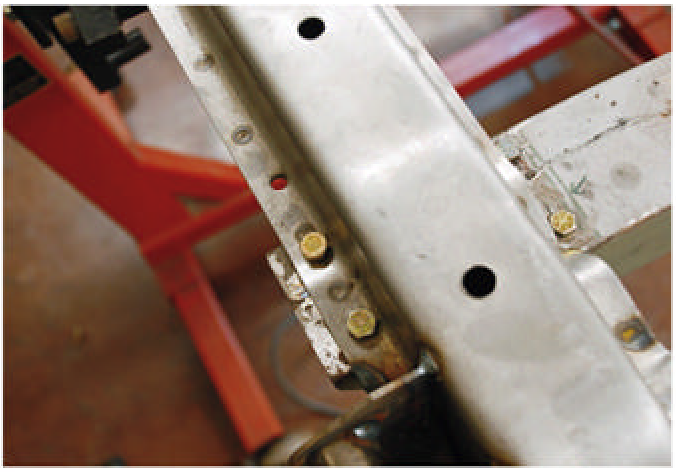
13 **We TIG welded the plates in place on both framerails making them actually stronger than new. The line on the inner framerail is where the old crossmember was located.**



14 **Here is the finished repair, note the two front bolts (left) have been eliminated. This entire permanent repair will be covered by the new rear crossmember.**

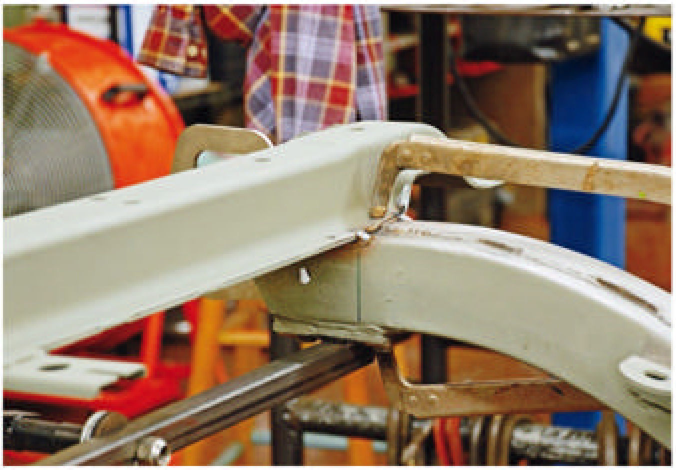


15 If you have performed the repair properly the crossmember should fit like this. If it doesn't, do a little grinding on the welds until the crossmember fits perfectly.



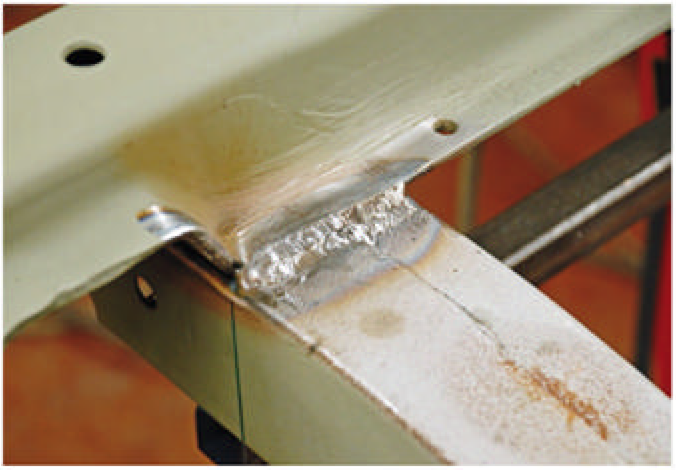
16 The two rear rivet holes are used to bolt the new Corvette Central rear crossmember in place. Just snug the bolts down at first so you can take measurements.

17 We used one of the rivets for the crossmember as a measuring point back to a hole in the new crossmember. We cross-measured and also measured straight down the framerail to ensure the crossmember was properly positioned.



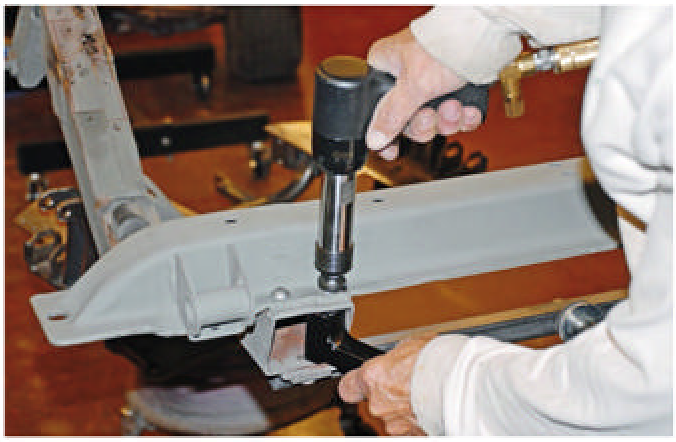
18 Satisfied that the crossmember was centered and square to the framerails and in the proper front-to-rear position we clamped and tack welded the crossmember in place.

19 After double-checking our measurements, we fired up our trusty Miller Synchrowave 200 and TIG welded the crossmember. Remember to alternate sides to prevent any chance of pulling the crossmember out of alignment.

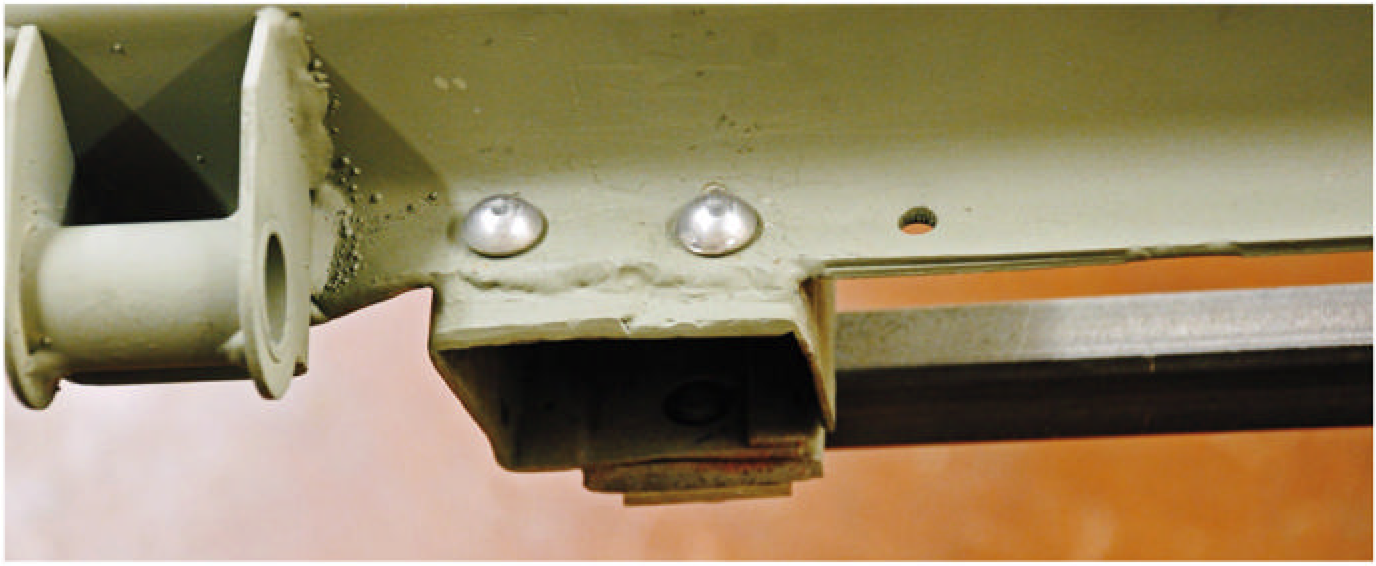


20 We lap-welded the flange with two passes for a strong, clean weld. If you are doing a faithful restoration, a stick or MIG would be used in a series of shorter welds.

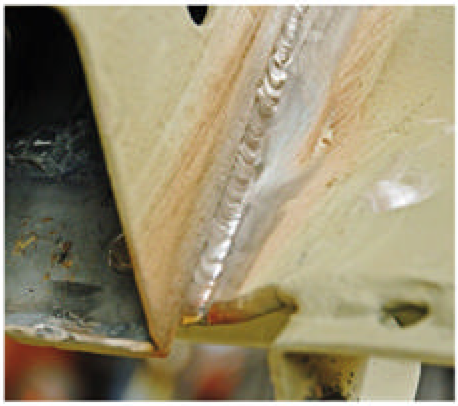
21 Few things are manlier than wielding a rivet gun during your project. Corvette Central has manual rivet drivers available too, but since we have a pneumatic one it's time to drive some rivets.



22 Holding the bucking bar inside the framerail, the rivet gun squeezed off some good hard raps expanding the rivet into the hole. In a matter of minutes we had four rivets in place.



23 Looking to the world like a factory-installed rivet, this project is almost done. Note the full weld on the rear of the framerail, the rivets were simply a locating tool, the welding is doing the work now.



24 The factory crossmember had no welding in the crossmember joint on the outboard side of the frame. We TIG welded that entire seam on both sides of the framerail. This prevents water from ever migrating between the crossmember and framerail.

25 And here it is, the completed Corvette Central reproduction rear crossmember in place on our '60 Corvette frame. Now we're ready for some new suspension, front and rear.

Sources

CORVETTE CENTRAL
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SPLIT-WINDOW PERSONALITY

RON SCOTT'S '63 CORVETTE OFFERS THE BEST OF BOTH WORLDS

PATRICK HILL WORDS
JERRY HEASLEY PHOTOS

Emulation is probably one of the most commons things in the car hobby. We see a car at a show or race and are instantly entranced by its siren song of looks, performance, and imagination-stimulating allure. And after enough exposure, commitment to building a duplicate becomes irresistible.

Ron Scott Jr. had always loved the vintage race look on classic Corvettes. Wide wheel flares, spoilers, race-style wheels and brakes, the growl of a powerful V-8 through headers and race exhaust, they all had him entranced to the point he wanted to build one of his own. He wanted a car he could not only show, but also take to track days and autocross events as well. After searching online, he found a suitable candidate on eBay to start his build with.

"I found the car on eBay for $35K. It was rough, with some bodywork completed and a second-gen LT1 out of an early fourth-gen Camaro sitting in the frame. It was pretty much a roller with no interior, wiring, or anything special. It was perfect for what I was looking to do, as we didn't want to modify anything that was nice."

With the car in the shop and ready for work to begin, the first order of business was figuring out the right way to get the look Ron wanted, while utilizing modern components. After three different designs were looked at for the fender flares, the right combination finally emerged, leading to the next step, wheel and tire and brake selection. The front spindles were changed to Global West C3 2-inch drop pieces, along with Global West tubular control arms and Bilstein non-adjustable shocks. This made the necessary room for C6 Z06 brakes to be installed, along with a Global West front sway bar.

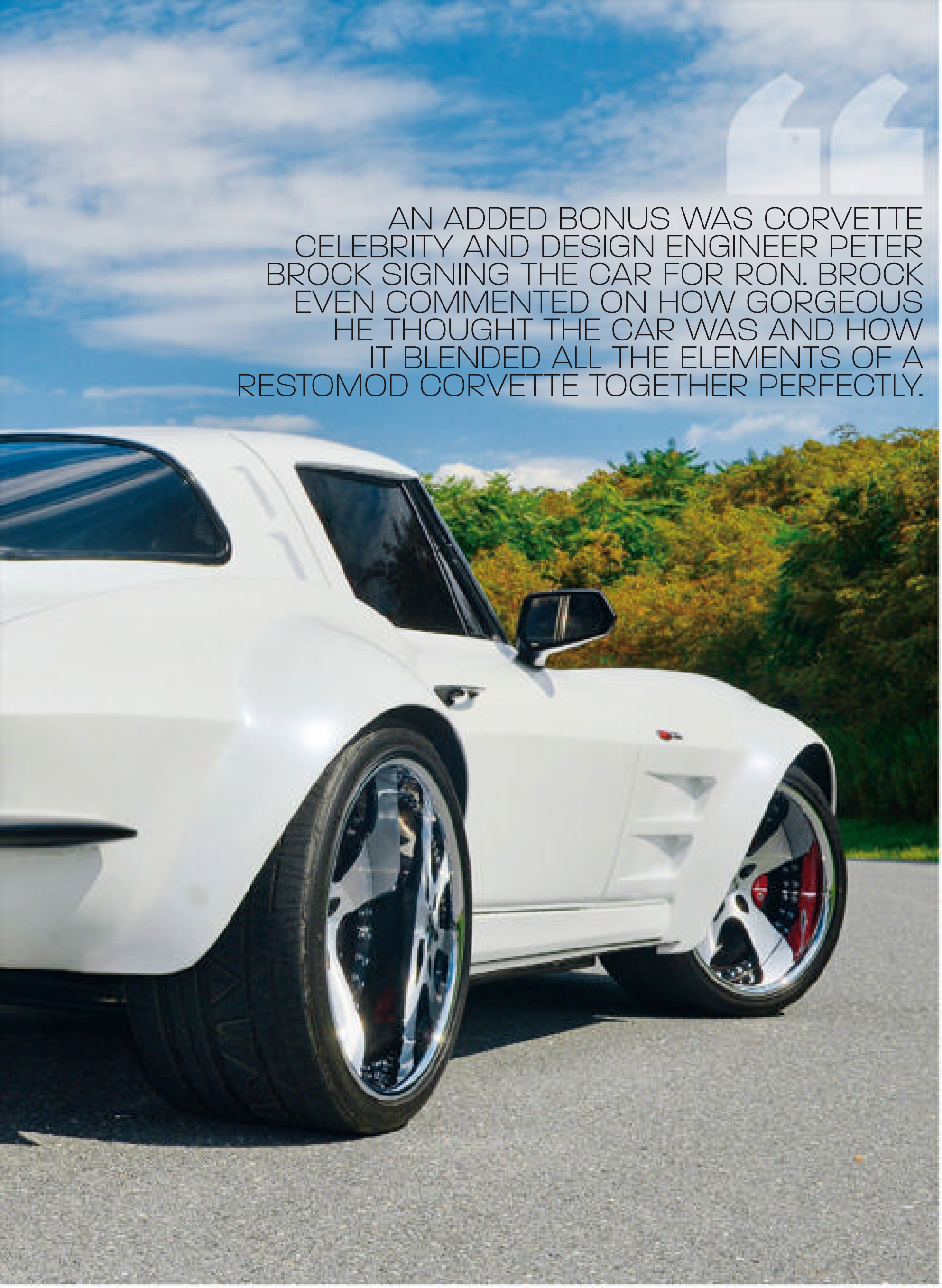
In the back a Global West 2-inch lowering spring was used along with Global West sway bar, Bilstein non-adjustable shocks, and C6 Z06 rear brakes. The wheels around the brakes are Donz Ferrigno forged wheels wrapped with Nitto rubber.

With those aspects set, Alfred Hamblin went to work massaging and finishing the C2 body so Monty King of King's Restoration in Cloverdale, Virginia, could do the final prep before spraying the car in Aston Martin Morning Frost White, then installing the wiring and interior.

For the drivetrain, even though the car was going with a Z06 theme, Ron went with a proven LS3 crate engine from Chevrolet Performance because it was more readily available. Behind that is a Tremec TKO 600 six-speed spinning a Driveshaft Shop driveshaft connected to a built C3 rear with 3.90 gears and limited-slip–equipped differential.

After five years of off and on work, the '63 was finally complete, just in time to show off at the 2013 Corvettes at Carlisle show, which celebrated the 50th anniversary of the '63 Corvette coming out. An added bonus was Corvette celebrity and design engineer Peter Brock signing the car for Ron. Brock even commented on how gorgeous he thought the car was and how it blended all the elements of a restomod Corvette together perfectly.

Since completion, Ron's only been able to show the car and put a meager 500 miles on it to get things broken in before hitting the track. He admits it's not from a lack of wanting, just that other projects have kept him from climbing behind the wheel for a proper shakedown of the car. And because the car turned out way nicer than expected, especially the paint, there's a bit of gun shy nervousness to overcome before exposing the '63 to the danger of rock chips in the paint and other track debris marring the pristine finish. But in 2015 he hopes to get the car to a few autocross and track events to see how it behaves. On the street, the car rides and handles like a new Corvette, which can only be taken as positive, foreshadowing how it'll perform in a more aggressive driving environment. **VETTE**

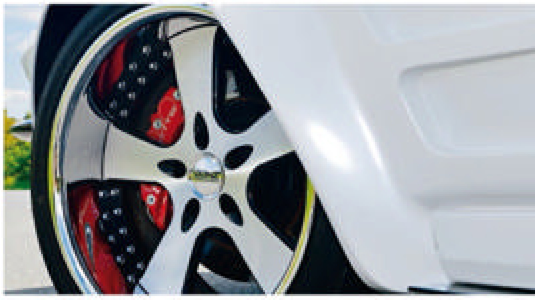


> AN ADDED BONUS WAS CORVETTE CELEBRITY AND DESIGN ENGINEER PETER BROCK SIGNING THE CAR FOR RON. BROCK EVEN COMMENTED ON HOW GORGEOUS HE THOUGHT THE CAR WAS AND HOW IT BLENDED ALL THE ELEMENTS OF A RESTOMOD CORVETTE TOGETHER PERFECTLY.

SPEC**SHEET**

1963 CHEVROLET CORVETTE

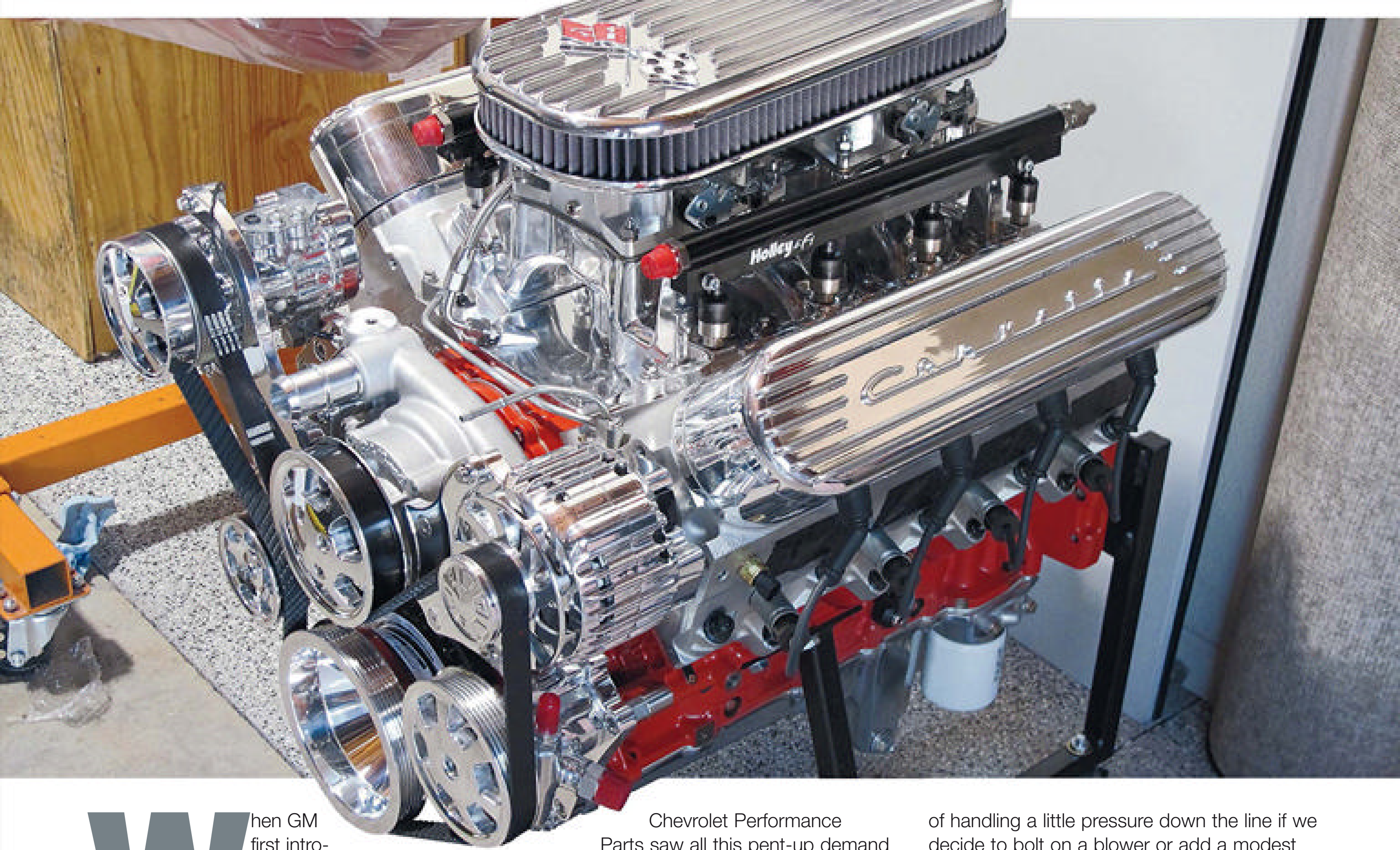
OWNER	Ron Scott
ENGINE	Chevrolet Performance LS3
TRANSMISSION	Tremec TKO 600
DRIVESHAFT	Driveshaft Shop
FRONT SUSPENSION	Global West tubular control arms, C3 2-inch drop spindles, and sway bar. Bilstein shocks
REAR SUSPENSION	Global West 2-inch drop spring, C3 wheel hubs, and sway bar. Bilstein shocks
BRAKES	C6 Z06 rotors and calipers, front and rear
WHEELS	Donz Ferrigno 19x11.5, front; 20x13.5, rear
TIRES	Nitto Invo 285/30ZR19 front; 345/25ZR20, rear
PAINT	Aston Martin Morning Frost White



DOUBLE TAP

A TWIN THROTTLE BODY 440-INCH LS ENGINE THAT PUTS OUT OVER 630 HP

STEVEN RUPP WORDS | PHOTOS

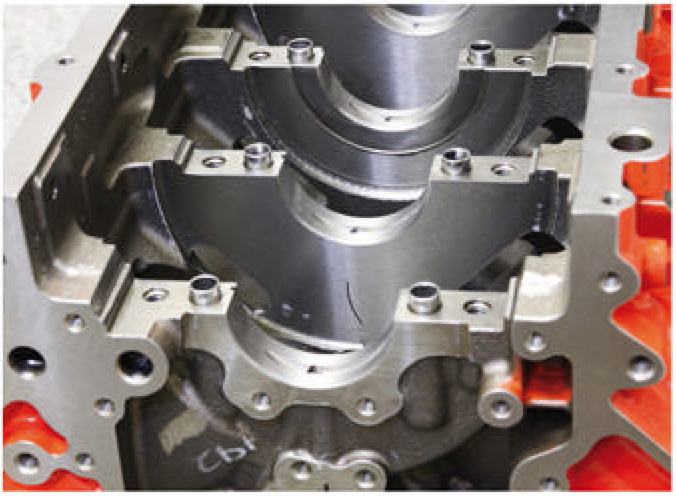


When GM first introduced the LS series of engines back in the late '90s these all-aluminum mills set the Chevy performance world on end, and since then it's only gotten better. The 346-inch LS1 begat the 364-cube LS2, which later gave way to the LS3 that displaced 374 cubic inches. The growth spurt came to an end with the 427-cubic-inch LS7. Sure, there were other LS-based engines out there stuffed in many of GM's offerings, but none exceed the displacement of the LS7 developed for the Corvette Z06. But what if you want more? After all, the term "there's no replacement for displacement" is more than just a catchy phrase. LS3s can easily be poked out to 416 cubes and even the expensive, and sometimes hard-to-find, LS7 block is ripe for a stroke. But all these GM blocks are limited in terms of bore size.

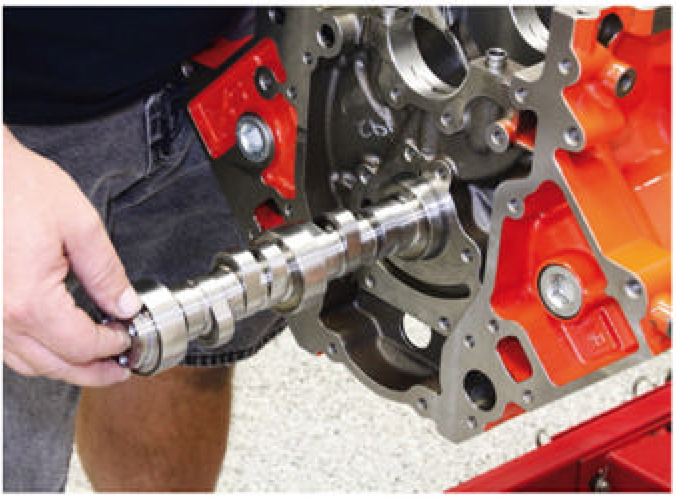
Chevrolet Performance Parts saw all this pent-up demand for big-displacement LS-style engines and decided to introduce a cure: the LSX block. The design of the iron block means that it can be bored out to 4.250 inches and it also means it's strong enough for high-compression or boosted applications. Additionally, it offers "race engine" features not found on GM production line blocks. Best of all, at about $2,400, it's typically less expensive than its hard-to-find LS7 cousin.

For simplicity sake (or maybe to just annoy the Mopar folk) we decided to build a 440-inch small-block using a big-bore/short-stroke combination. The 4.185-inch bore and 4.000-inch stroke sounded perfect to us and this wouldn't be pushing the boundaries of the LSX block, which equates to reliability. We also chose to go naturally aspirated to keep more cash in our pocket. But it's nice to know that the LSX block is capable of handling a little pressure down the line if we decide to bolt on a blower or add a modest shot of nitrous. VETTE

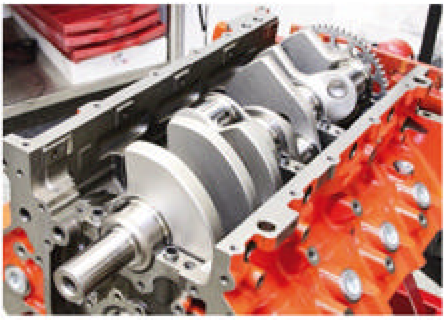
01 GM Performance Parts LSX Bowtie iron block (PN 19213964) offers quite a few features not found on factory LS blocks—tidbits like extra head bolt provisions and thicker deck surfaces.



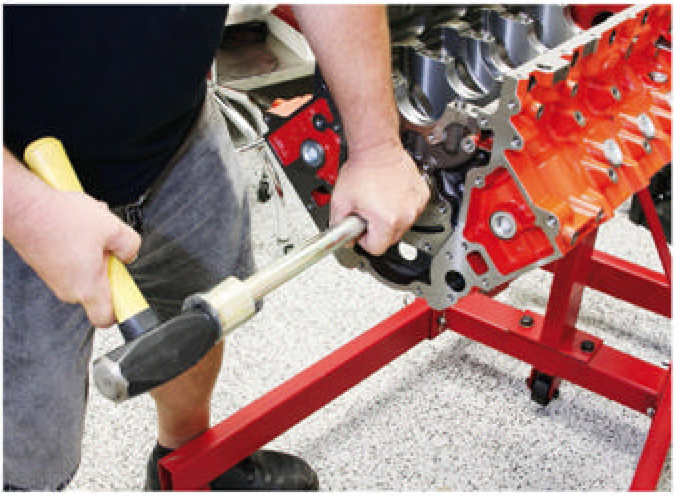
02 Other refinements include improved bay-to-bay breathing, doweled main caps, a seventh transmission bolthole, and a priority main oiling system. For this build we opted to use Clevite main bearings (PN MS-2188HX) and lots of assembly lube. You can also see the LSX block's dowels for the billet main caps.



04 When it came to choosing a camshaft, we wanted good power but decent street manners as well. We also told Lunati that we didn't mind if the engine sounded a bit snotty so long as it was streetable. What they came up with was a hydraulic cam (PN 20549911) with duration numbers (at 0.050) of 247/255, lift of 0.624, and a lobe separation angle of 114 (+4).

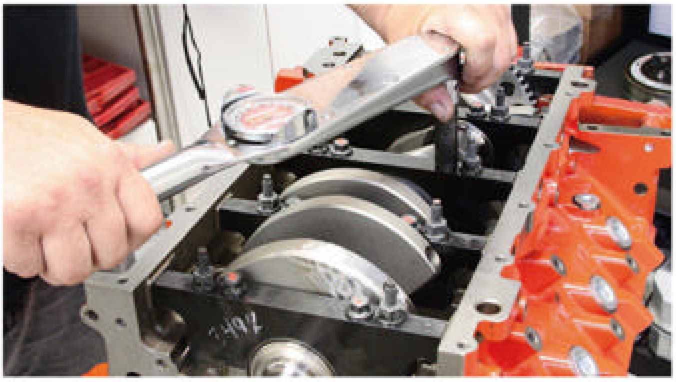


06 We've been fans of Lunati's line of cranks for quite a while, but for the longest time their only LS offering was in their 1,500hp Signature Series crank. While that crank was a work of art, the price tag was hard to justify on a sub-700-horsepower engine. Well, they now offer LS cranks in their Voodoo lineup that are high-quality and wallet friendly. This 4340 non-twist forged crank (PN 70840001) has lightening holes in the rod journals to reduce inertia and is nitride heat treated. Even better is that it came in at less than half the cost of their Signature Series cranks. We call this a win/win.

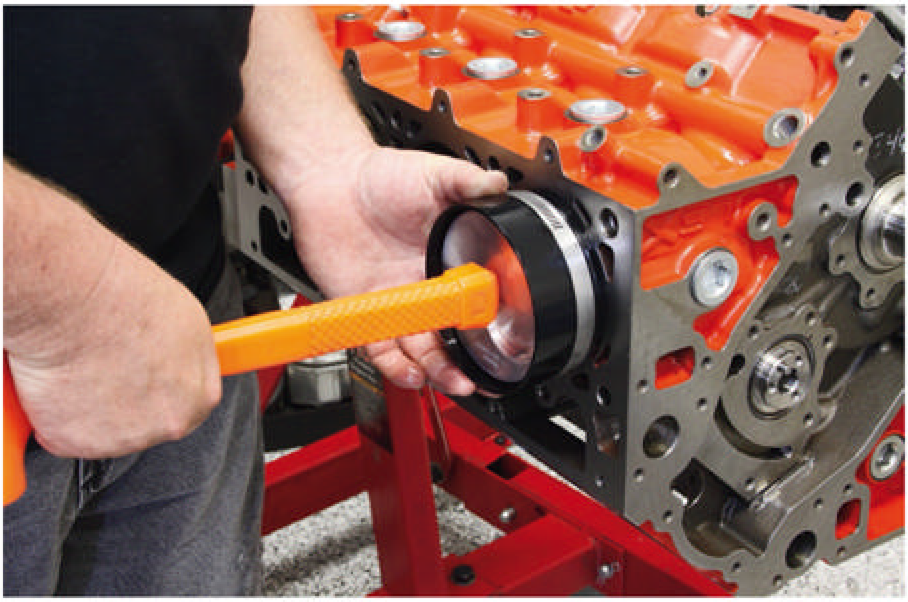


03 Chris Pollock then went about the task of properly installing the cam bearings.

05 When rotating assemblies fail, it's typically the rods that let go, and given the stresses placed on connecting rods it's no wonder. These Lunati H-beam 6.125-inch rods (PN 70361251-8) were fitted with Clevite rod bearings (PN CB-663). Their forged 4340 steel construction provides strength while still weighing less than stock rods. Each rod is heat-treated, magnafluxed, and shot-peened to stress-relieve the metal. The rods also came standard with ARP cap hardware. They were paired up with Wiseco slugs (PN K395X185). The 4.185-inch forged pistons had two valve reliefs and were designed to clear the reluctor ring on stroked engines. They also came with their ArmorGlide skirt coating that helps minimize friction and wear.



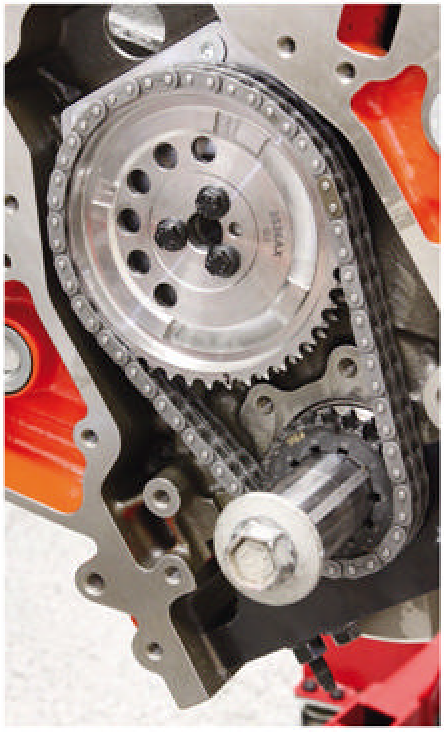
07 Chris then torqued down the billet steel main caps, a feature that adds tons of additional strength to the block. If you want even more strength, you can replace the supplied main bolts with ARP hardware.



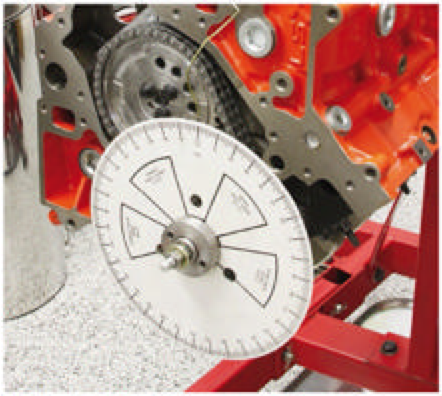
08 The block came with 3.990-inch semi-finished bores that can be taken all the way out to 4.250 inches. In our case, we were looking to build a 440, so Evod Garage had the cylinders knocked out to 4.185 inches. One other nice feature of the LSX block was that Chevrolet Performance had the foresight to notch the cylinder sleeves for stroker rod bolt clearance, which saved us a ton of time.

09 We started by just installing one piston and setting the head in place. This let us confirm the piston to valve clearance before bolting the whole deal together.

10 The GMPP LSX block uses a proprietary cam retention plate, but it's really no big deal since they are nice enough to include it with the block.

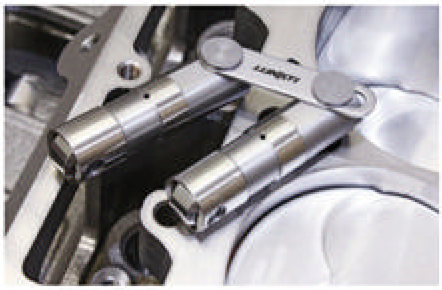


11 For LS builds, one of our favorite timing sets is this one from Lunati (PN 95536). Their keyway-adjustable billet timing set has steel billet gears and a nine-keyway crank sprocket. This allows for one-degree adjustments with a maximum range of four-degree advance/retard. It also has a large-pin 0.250-inch double roller chain that came pre-stretched and heat treated. We bolted it to the cam with three ARP fasteners (PN 134-1003).



12 The next step was to degree the camshaft. Many LS builders skip this step, but it's a good idea and takes less time than fixing it later.

13 To handle our 440's oiling needs we installed this pump from GM (PN 17801830). Before going on the engine, Chris disassembled the pump and worked it over a bit, but kept the stock spring.



14 These captured link bar lifters from Lunati (PN 72332-16) are a great hydraulic lifter for the money. The Chevrolet LSX blocks do have their own plastic lifter trays (different than on a production LS engine), but we feel the link bar lifters are a bit more stable.

15 To seal the deal between the heads and block we tossed on a pair of Fel-Pro PermaTorque MLS gaskets (PN 26496L/R041).

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"Nice watch," I said, pointing to his and holding up mine. He nodded like we belonged to the same club. We did, but he literally paid 100 times more for his membership. Bigshot bragged about his five-figure purchase, a luxury heavyweight from the titan of high-priced timepieces. I told him that mine was the ***Stauer Corso, a 27-jewel automatic classic now available for only $179.*** And just like that, the man was at a loss for words.

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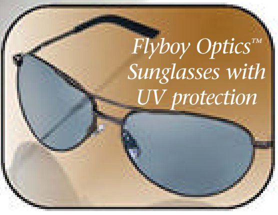

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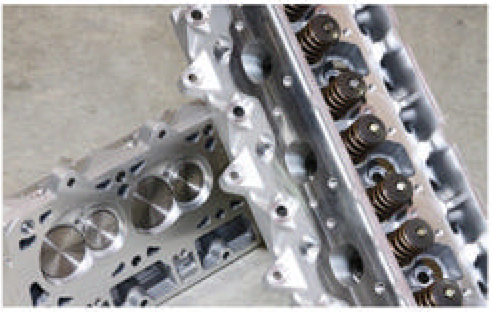


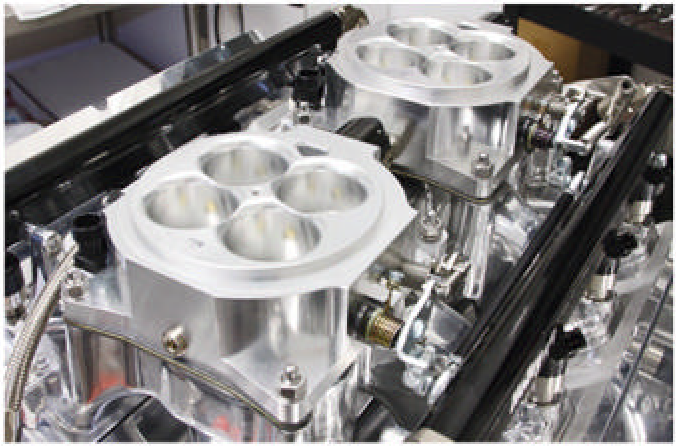
16 Like a stereo system needs good speakers to perform, a short-block needs to be topped off with a set of killer heads. For this build we went with a set of Trick Flow GenX 245 cylinder heads (PN TFS-3061TS14-C74). The big, 245cc intake ports should feed our 440 well and they are designed for large-bore (4.125 inches and up) LS engines. The heads have 64cc combustion chambers and are completely CNC detailed. This equates to more airflow and better combustion. Trick Flow also altered the valve angles from 15 to 13.5 degrees to further decrease shrouding. They came assembled with 2.10-inch intake and 1.60-inch exhaust valves and ready to bolt in place.

17 The six-bolt Trick Flow heads were mated to the block using an ARP head stud kit (PN 234-4319). The extra bolt adds a lot of strength to the equation and is especially helpful in boosted and nitrous applications. In our NA engine it's not really needed, but since we have a six-bolt block and six-bolt heads, there's really no downside to doing it. All the ARP studs were slathered in assembly lube prior to being spun in place.

18 To finish off our valvetrain, we went with a set of Lunati VooDoo aluminum roller rocker arms (PN 15425-16). They feature aircraft-grade aluminum bodies, extra-large trunnions, and high-quality bearings. For pushrods, we ran hardened versions with a length of 7.450 inches.

19 For this engine, we wanted to try something a bit different. After all, we all know that traditional LS intakes work great, but they aren't exactly good looking. Given this, we picked up this Holley LS dual-plane 2x4 cathedral-port intake manifold (PN 300-121). It's designed to produce mid-range torque and high-rpm power from 1,500 to 7,000 rpm. It came with fuel injector ports ready to go and black fuel rails. Since it's aluminum we sent it out to get a full polish job. Hey, looking good isn't a crime.

20 To round out our EFI fuel system we picked up a set of Holley high-impedance fuel injectors (PN 522-488). They have a flow rate of 48 lb/hr and can support over 750 hp, more than enough for our 440.



21 Yeah, we could have rolled old-school and ran dual carbs, but since we had fuel injectors we opted for twin 1,000-cfm throttle bodies. These 4150-flange billet throttle bodies (PN 112-577) look killer and they flow a ton of air. The linkage is standard Holley stuff, so getting them to work together was cake.

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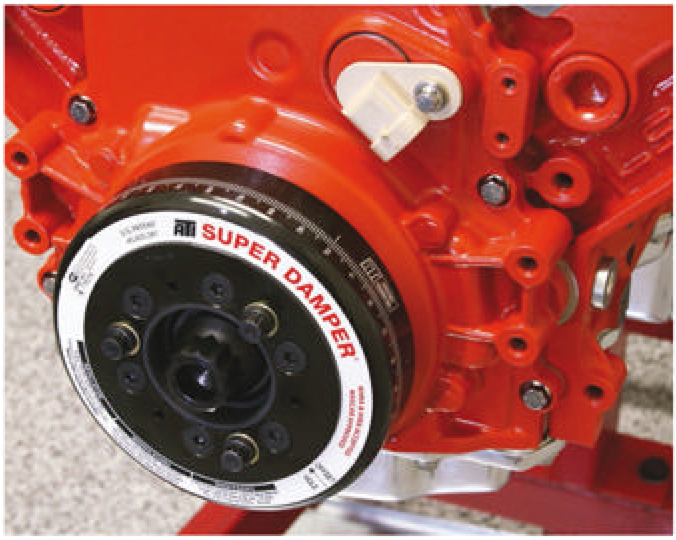
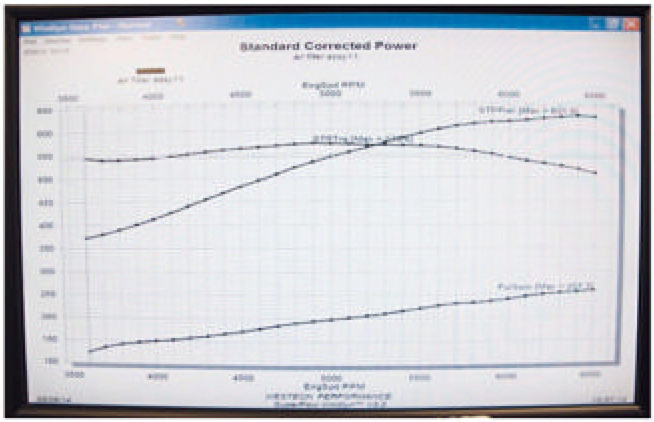


22 A new offering from COMP makes running a double roller chain easy. Their LS timing cover (PN 5496) has provisions for a timing pointer, an OEM camshaft sensor, and any regular SBC crank trigger. You can also adjust that cam sensor for use with raised cam blocks like their RHS LS race version. We gave the cover a coat of Chevy Orange paint to match our block and installed it using ARP stainless fasteners. The ATI Super Damper was installed and secured with an ARP crank bolt.

23 You have to admit, that's pretty damn nice looking for an LS. The polished Holley intake and custom Evod Industries valve covers (with integrated coil covers) just look bitchin. To finish the build, we polished up a Holley oil pan (PN 302-1) and installed it using stainless ARP fasteners from our kit (PN 534-9605). The pan came with a pickup tube, but we had to get an F-body windage tray (PN 12558253) and LS3 dipstick set from GM (PN 12634547 and 12625031).

24 We hauled the fresh 440 over to Westech Performance and strapped it to their Superflow 902 engine dyno.

25 Before firing it up and performing the break-in procedure, we filled the mill with 6 quarts of Lucas engine break-in oil. It's a roller engine but the extra zinc is just a good idea when everything is new.



26 After some tuning pulls, we were rewarded with a best blast of 632 hp at 6,400 rpm and 571 lb-ft at 4,900 rpm. The torque band was nice and flat with 543 lb-ft way down at 3,600 rpm. Hell, even at the end of the pull our 440 was still making 509 lb-ft of twist and that's just a good time waiting to happen. The run was made on 91-octane and we had mufflers installed on the engine. We even installed the custom billet Evod air cleaner, complete with Corvette crossed flags, and got the exact same numbers. This was most likely due to the huge amount of air being supplied by the twin 1,000-cfm Holley throttle bodies.

Sources

ARP (AUTOMOTIVE RACING PRODUCTS)
800.826.3045
arp-bolts.com

ATI PERFORMANCE
877.298.5039
atiracing.com

CHEVROLET PERFORMANCE
chevrolet.com/performance

COMPETITION CAMS – COMP
800.999.0853
compcams.com

EVOD GARAGE
760.737.0046
evodwheels.com

FEL-PRO
felpro-only.com

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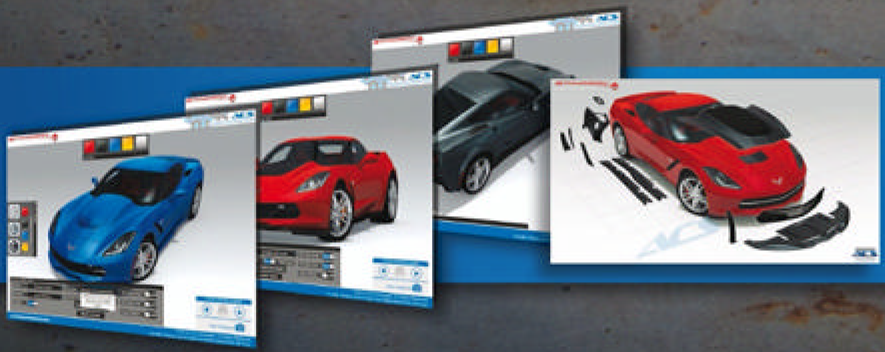

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TREND SETTING— PART 7

A LOOK BACK AT CHEVROLET'S EXPERIMENTAL, PROTOTYPE, CONCEPT CAR, AND SHOW CAR CORVETTES

SCOTT TEETERS WORDS | ILLUSTRATIONS
GENERAL MOTORS PHOTOS

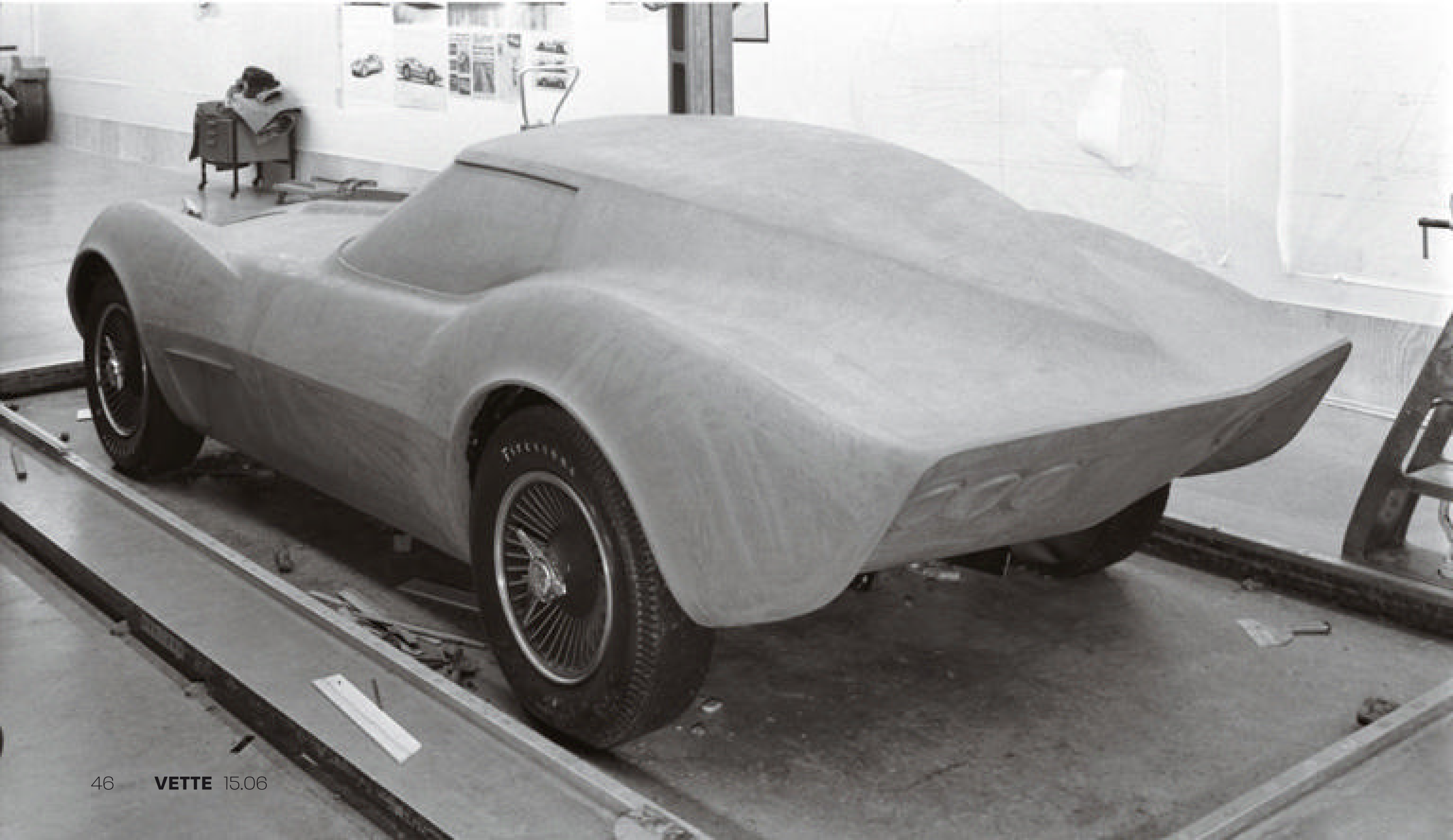
General Motors makes hundreds of kinds of cars and trucks. Some sell hundreds of thousands of units a year, which makes Chevrolet's Corvette a complete enigma. Given the small number of Corvettes sold every year, it is a modern American manufacturing miracle that the car survived for 61 years.

The Corvette was "officially" born on January 17, 1953 at the GM Motorama Show at the Waldorf Astoria Hotel, in New York. To understand the impact of Harley Earl's two-seater sports car concept car, you have to look at typical cars of 1953. The car was low and sleek, and wasn't over festooned with styling gimmicks. Based on the response from attendees, Chevrolet rushed the car into production, and the rest is history.

Today, the Corvette is GM's flagship car. When Chevrolet unleashes a new Corvette, the automotive world stops to take notice.

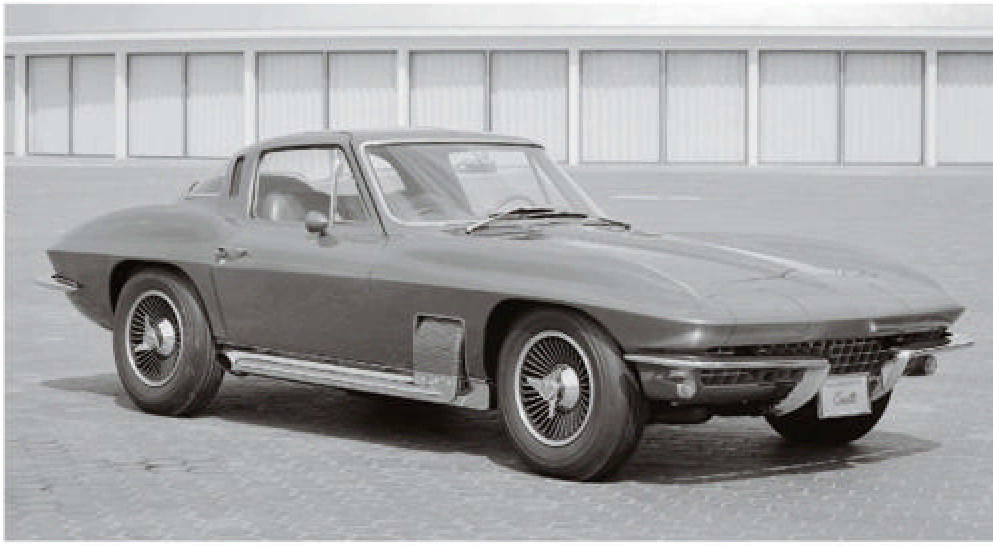
But things were not always this way. Up to the C4, there were many inside GM that wanted to see the Corvette go away. For the first 20-some years, the car suffered from an identity crisis. Inside GM there were always those that wanted the Corvette to be something different; a lightweight sports car, a mid-engine car, a rear-engine car, a four-seater personal luxury car, powered by a boxer-type flat-six, Wankel rotary-powered, turbocharged small-displacement hemi-headed double-overhead cam powered, and even an all-aluminum car. Chevrolet kept the loyal faithful stoked with two or three experimental, prototype, show car Corvettes per year. From an enthusiast's perspective, this was endlessly fascinating.

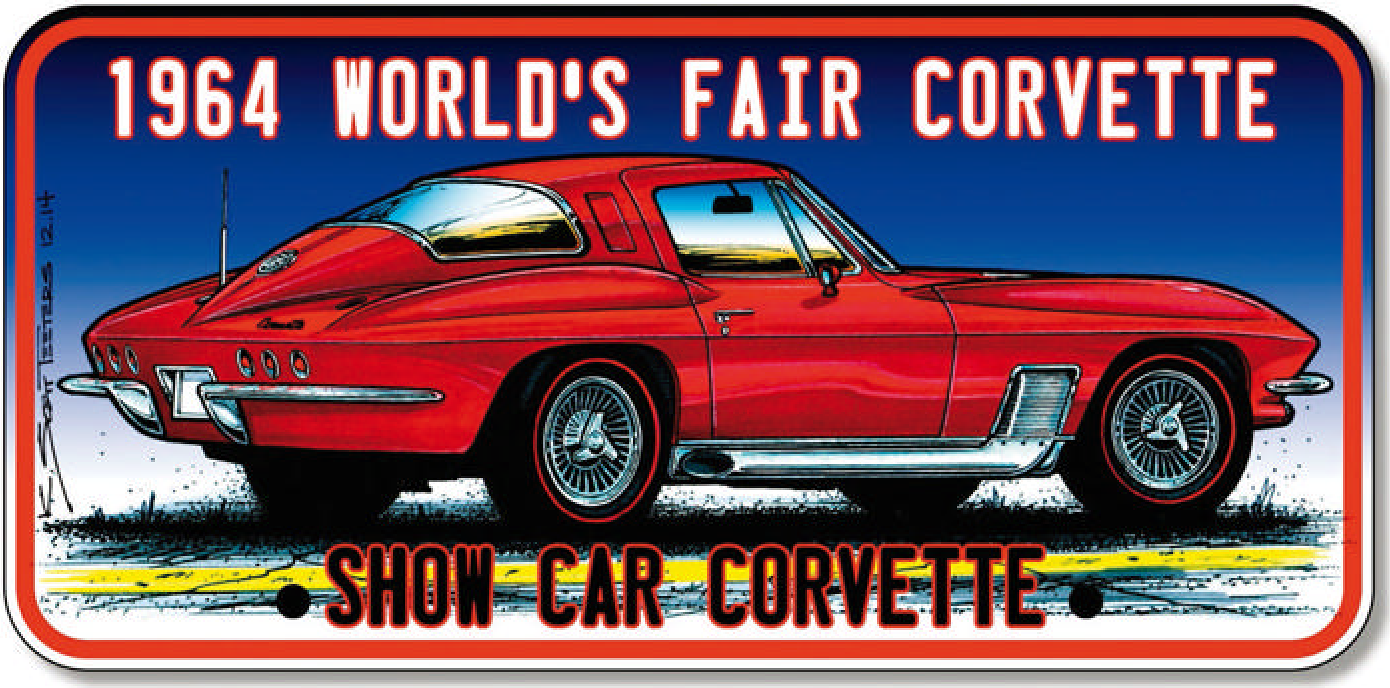
This is part seven of a chronological look back at Chevrolet's high-profile experimental, prototype, concept car, and show car Corvettes. Some of the cars had exotic names such as, "Astro-I," "Astrovette" and "Geneve." Others had experimental prototype numbers, such as "XP-700" and "XP-882." And some had sexy names, such as, "Nomad," "Mulsanne," "Snake Skinner," "Mako Shark," and "Tiger Shark." In retrospect, a few of the cars were the shape of things to come, but most were simply, "Here's an idea of something we're working on." Either way, it was all a ton of fun!



1964 World's Fair Corvette

It was post JFK assassination America, the Beatles had arrived, and anticipation for the 1964-1965 New York World's Fair was over-the-top. This was corporate America's chance to show off their goods, as well as present their vision of "The Future." The biggest attraction was the GM Futurama. Inside the exhibit, visitors viewed scale models and a multi-media show of GM's vision for the "near future." Part of the window dressing for GM's vision of the future was the Stiletto concept car and a bright red, dressed up '64 Corvette Sting Ray coupe.



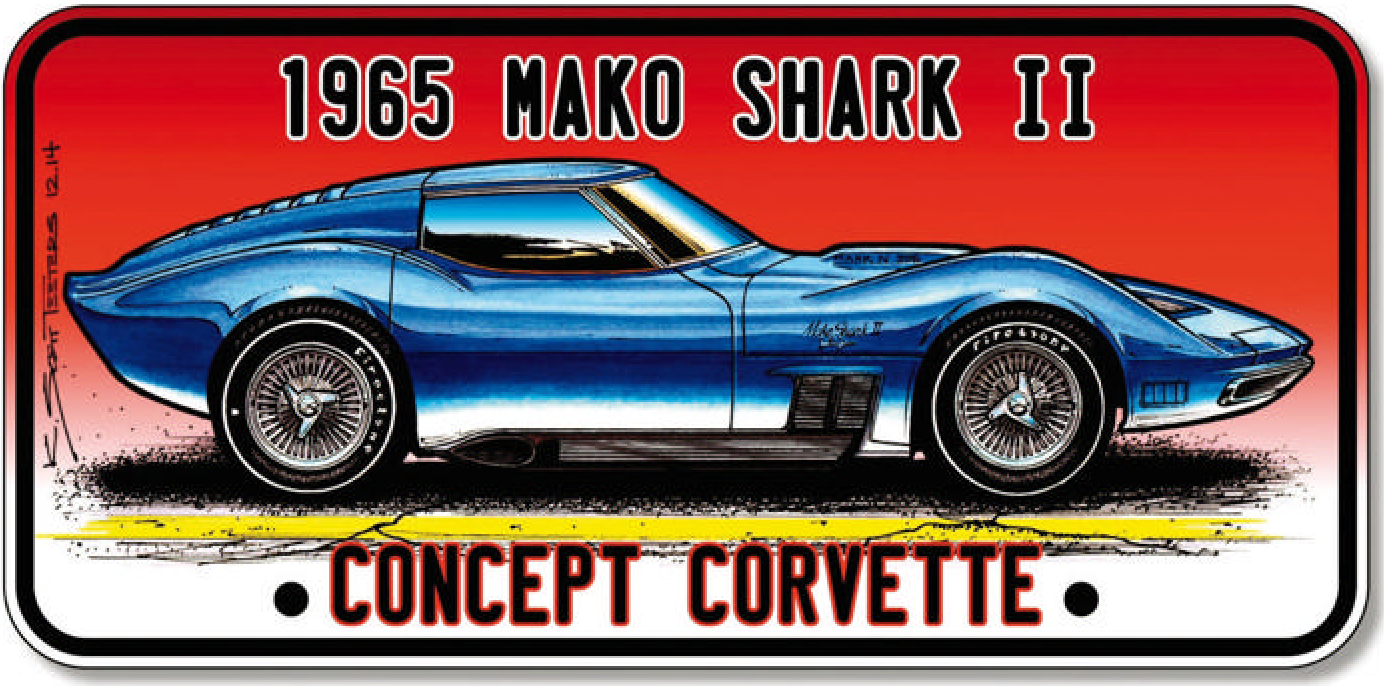


The Corvette already looked like a car from another planet, so the Chevrolet Styling Department had lots of fun with this one. In 1964, Corvette buyers had the choice of a coupe or roadster, a variety of engines, manual or automatic transmission, an assortment of extras, and color options. Today, dealerships are boutiques where you can trick out your Corvette with a staggering amount of options. If Chevrolet had the boutique model back in 1964, a Corvette similar to this might have been available.

There were three major features on the World's Fair Corvette that just screamed out. First was the deep, 16-coat, candy apple red paint that accentuated the beautiful curves, creases, and humps of the Sting Ray. Next was the unique side-pipes treatment. Bill Mitchell, GM's Chief of Styling *loved* side-pipes, that's why nearly every Corvette show and concept car had them. Actually, what was on the show car were non-functioning plastic mockups. The public didn't know that side-pipes would soon be an option on the '65 Corvette. And lastly, there was something very interesting happening on the smooth '65-'67 hood—the chromed fuel-injection plenum chamber cover was poking through the hood! It only took 45 years for the "peekaboo" hood treatment to show up on the '09 ZR1. This was no mocked-up, non-functioning feature, either. A special, tall fuelie unit was created to achieve the effect. Of course, the fuelie was on its way out, to be replaced with the Mark IV big-block, but this would have been a very cool option.

The car was very close to a production version, but dripping with extras. Brakes were upgraded to '65 four-wheel discs and up front the egg-crate grille would later show up on the '67 Corvette. The production interior air vent on the B-pillar was replaced with a forward-facing, mesh-covered scoop. On the rear deck, stylists added two elliptical air vents, similar to those of the 1959 Stingray Racer. Completing the exterior, two extra taillights were added. Under the hood, the L84 engine was painted black and dressed up with chrome valve covers, fan, ignition shield, fuelie meter body, air intake, and master cylinder top.

The interior can be best described as "rich." Everything was trimmed in exterior matching candy apple red leather, with matching deep-pile carpeting. Special features included high-back bucket seats, brushed aluminum door panels with three sequential flashing reflectors on each panel, special gauges, brushed

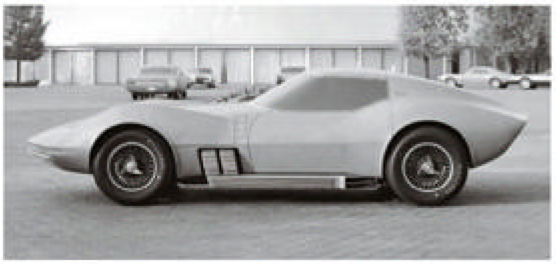


aluminum instrument and glovebox bezels, a red leather glovebox page with special "Stingray" script, red weatherstripping, and chrome floor grates.

When special cars, such as this, have fulfilled their mission, they are usually put into storage, sometimes sold, and occasionally destroyed. While in storage, the car was mildly vandalized and then repaired. A few years later the car was later purchased by GM executive Alex Mair as a gift for his 16-year-old son Steve. Mair had some minor upgrades and a functioning under-the-car exhaust system installed. Fortunately, Steve knew what he had, enjoyed the car, but treated it with kid gloves before he sold the car in the late '80s. "Corvette Mike" became the next owner, followed by the owners of The Blackhawk Collection, and finally into Mike Yager's collection. Yager had everything refreshed and made roadworthy, plus added an important feature. The non-functioning, plastic side-pipes were replicated and made into a functioning side-pipe system. In 2011, the car was valued at $1,250,000.

1965 Mako Shark II Concept

The 1965 Mako Shark II is arguably the most important concept/show car Corvette ever made. There are several factors to consider. First is the time context. The Sting Ray was already light years ahead of anything else on the road in 1964. The design has aged perfectly, such that even today, when you see a '63-'67 Corvette on the road, it's a head-turner. Even though the Sting Ray was a radical departure from the first-generation Corvette, Bill Mitchell, not content to rest on his laurels, wanted to take things even further. Little did he know that he would be creating the overall template that lives on today in the C7, as seen in the accentuated front fender humps that swoop down into the low grille. It is the signature Corvette "look." There have been many interesting-looking concept cars that wore the Corvette badge, but didn't look like a Vette. This "look" was so important that on October 25, 1966, Bill Mitchell received U.S. patent number 206,023 for design.



Mitchell could be a tough taskmaster, but he let his designers "design." Here's his vague instruction of what he wanted for the next Corvette, "a narrow, slim, 'selfish' center section and coupe body, a tapered tail, an all-of-a-piece blending of the upper and lower portions of the body through the center (avoiding the look of a roof added to a body), and prominent wheels with their protective fenders distinctly separate from the main body, yet grafted organically to it." Got that? Clear as mud, right? Fortunately, Senior Designer Larry Shinoda had the unique ability of being able to see what Mitchell was vaguely looking for. The two men, along with Shinoda's team collaborated until Mitchell's inner vision was brought into reality.

Once the shape was finalized, a fullsize, non-running, exterior/interior mock-up was created. Built on an existing production chassis, the mock-up was 3 inches lower than the already low-profile production Corvette and was deceivingly small. When the car was photographed in Styling's viewing year with former Miss Teen USA, Conny van Dyke, the car looked much larger than it really is. However, there are other photos of Mitchell standing next to the Mako Shark II that clearly show that this is a tiny car—its proportions give the illusion of more size and mass than is actually there.

"Stunning" doesn't quite describe the Mako Shark II compared to anything domestic or foreign in 1965. Mitchell loved sharp edges and lines because to him, it looked like a freshly pressed suit. The Mako Shark II is loaded with sharp lines and crisp surface changes. Yet, there are those sensuous, lusty fender hump curves, the pinched in "Coke-bottle" sides and Sting Ray coupe-like roof—but extra crispy. Even the front windshield was creased in the middle. Tire companies were just beginning to develop "wide" profile tires and the Mako Shark II was shod with Firestones, 8.80-inch on the front and 10.3-inch on the back—huge for the day. The aluminum wheels looked like the optional 15x6 knock-offs on steroids, measuring 15x7.5, thus providing a nice deep-dish look.

The interior of the mock-up was very futuristic. Most notable was the aircraft-style steering wheel with built-in controls. Production gauges were built into the dash that sloped down and away from the passengers. The raised center console was a "bundling board" of switches and controls. The seats were fixed and headrests were attached to the roof. The steering wheel and pedals were adjustable.

After the initial gush was over, it was time for the Mako Shark II to get to work. The first stop was the New York International Auto Show in April 1965 and the Mako Shark II was to be the belle of the ball, the star attraction in the Chevrolet booth. There was simply nothing like it at the show. Everything else was like Pat Boone trying to be the follow-up act to Elvis Presley. Meanwhile, back in the Chevrolet Design studio, the order was given to make a running version.

1965 Mako Shark II Prototype

The Chevrolet Design team had six months to build a fully functional show car in time for the opening of the Paris Automobile Salon Show on October 7, 1965. While the pressure was on to build a driveable Mako Shark II, there were battles going on inside Chevrolet as to which direction the '67 Corvette should go. Pete Estes was the new general manager of Chevrolet and the Mako Shark II wasn't yet a sure thing. Henry "Hank" Haga in Chevrolet Studio 2 presented a "next-Corvette" design in April 1964 that was very different from the Mako Shark, featuring mostly straight lines, a very long hood, and a cabin set way back. It was an interesting design, and would have made a very cool Pontiac, but didn't scream "Corvette!"

When the Mako Shark was anointed as the "next Corvette," product planners wanted it to be a '67 model. Perhaps they thought that because the chassis, suspension, and drivetrain would all be carried over from the then-current production version, creating a new body and interior would be a snap. It turned out not to be the case and that's another story. The new Shark Corvette was pushed back to a '68 model that should have been a '69.

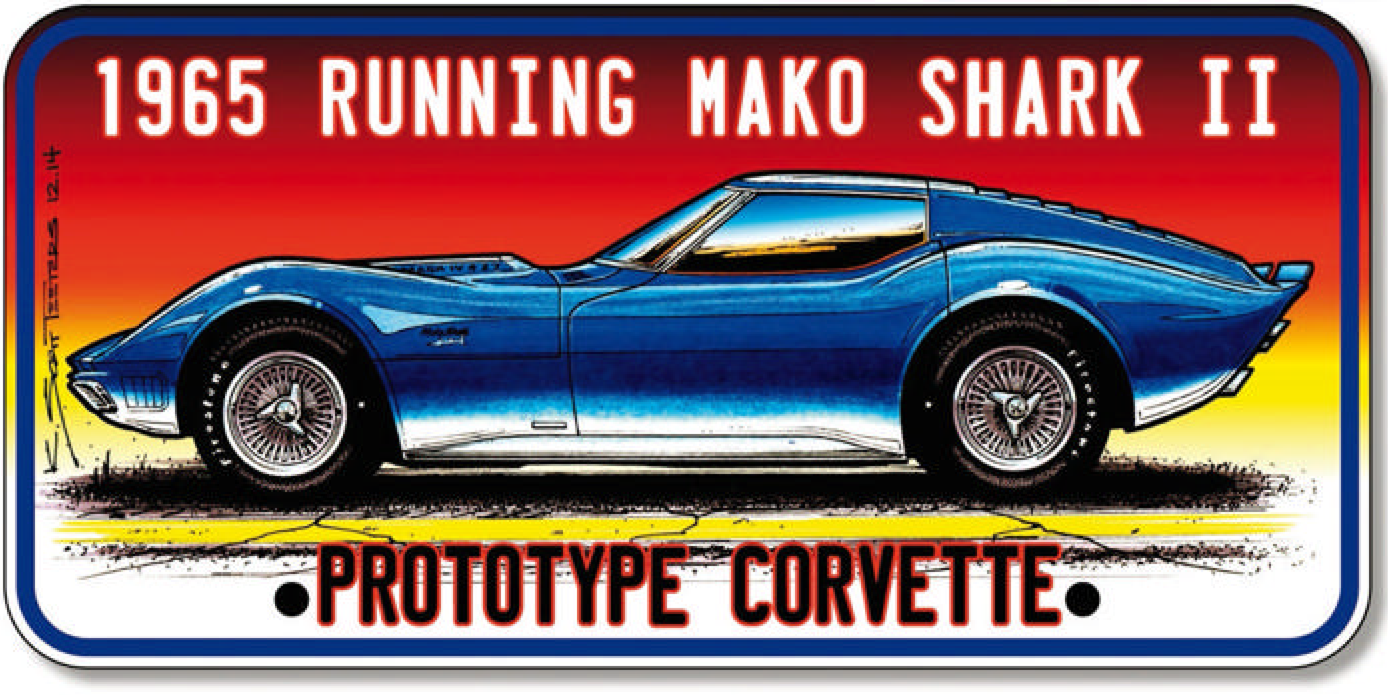
The most noticeable difference between the mocked-up and running Mako Shark II is the absence of the side exhausts on the running prototype. The nose is very long and slopes down below the driver's line of sight. Two large grilled air outlets towards the front of the hood helped vent hot air. Revolving headlights were at the leading edge of the nose. "Line of sight" was an issue with the car and many that drove it said that the large fender humps blocked more forward vision than they were used to. The windshield wipers were tucked away in a closet at the base of the windshield, a feature that made it into production.

Being 3 inches lower than the production Corvette, entering the car was difficult. The solution was the roof that lifted up from the back, interesting but not a real-world solution. Rearward vision had a Cadillac-sized blind spot because of the roof design. The rear window louvers were motorized and could be open or shut. The back end of the car had a retractable rear bumper and two retractable rear spoilers mounted at the rear leading edge of the duckbill spoiler. And finned, rectangular dual exhaust tips were under the rear bumper and in the center.

The interior was very futuristic and used fixed seats with an adjustable steering wheel and foot pedals. The dash was redesigned to include a neon counter-tube digital display and the center console had an array of switches and slide controls for heating and air conditioning. And attached to a conventional steering wheel and column were rotating thumbwheel controls. The accelerator and brake pedals were grated metal and quite large.

Making an awesome show car is one thing, designing a car for mass production is something else. There was very little unused space under the skin of the car. Seventeen fractional-horsepower motors, wiring, and fiber optic lines, in addition to the usual mechanical hardware, was all stuffed into a very small car.

The little teaser Corvette had no trouble working as a pace car at racing events, thanks to its 427 big-block engine and Turbo 400 transmission. As was often the case, Mitchell used the running Mako Shark II as a daily driver for a time. The running Mako Shark II had a short-lived period of stardom because once the '68 model was released, the Shark's once avant-garde status was exhausted. Unfortunately, this configuration of the Mako Shark II did not survive, but the car did. When the '68 production version of the Shark came out, Mitchell pulled the show car beauty in for an overhaul. In 1969, the car was reborn as the Manta Ray and is still with us. **VETTE**



CONCEPTUA

Jeff Nowicki is a designer at heart. He's also an accomplished Corvette racer, but deep down he'd rather be in his studio, shaping clay, studying proportion and balance, and crafting new, racing-inspired identities for Corvettes.

He's been doing it for more than 25 years, starting as a sculptor at GM Design, and through his previous venture Specter Werkes/Sports, where he channeled his creativity into his vision of track-inspired, premium-minded Corvettes: the C5- and C6-based GTR models. Specter Werkes built about 40 of them, along with the popular line of Group 6 bolt-on components.

Nowicki Autosport is his latest venture and it's focused on enhancing the looks and handling capability of the C7. Some would argue there's not much left to add to either category, but Nowicki's 2013 debut of the Concept7 proved there was. It earned two coveted Chevrolet Design Awards—Best Chevrolet Corvette and Best New Chevrolet Accessory—for the collection of carbon-fiber exterior enhancements that debuted on the car. It also wore Mobil 1 graphics, an acknowledgement of Nowicki's longstanding relationship with the company that has sponsored a number of his race cars over the years.

"The launch of the C7 Corvette seemed like the best opportunity to make a statement with Nowicki Autosport," says Nowicki. "There was also risk in it, because with a car as 'holy' as a new-generation Corvette, it is very easy to polarize and turn off enthusiasts if you don't get it just right."

With a silver Z51 coupe ordered and delivered through Colorado Corvette specialist Purifoy Chevrolet, Nowicki had only a few weeks to design, model, produce, and install the components before the big convention in Las Vegas—and the gamble paid off unquestionably. In addition to the SEMA design awards, Mobil 1 was so thrilled with the Concept7, they commissioned another for a national

LIZED

NOWICKI AUTOSPORT'S CONCEPT7 ADVANCES THE LEGACY OF A RESPECTED BUILDER AND DESIGNER

BARRY KLUZCYK WORDS | PHOTOS

sweepstakes car. It was awarded last summer at the National Corvette Museum's all-new motorsports park, where Nowicki took the finalists for hot laps in his Concept7.

"Mobil 1 has always been a tremendous partner and to have their sweepstakes grand prize based on our design was a hell of an honor," says Nowicki.

Enthusiast and custom Corvette patron Barry Bloomquist—he commissioned that radical, black Roadster Shop-built C2 Pro Touring car that was everywhere a few years ago—also took note of the Concept7 and sought out Nowicki, asking about parts for the black C7 Z51 convertible he'd just ordered.

"I just loved the aggressive styling of the Concept7. It was exactly what I wanted," says Bloomquist. "[Nowicki] nailed the proportions just right, especially the wheels-to-body relationship, which makes or breaks a car's appearance to me.

Nowicki had just completed the Concept7 in time to make the SEMA show, so when Bloomquist asked for parts, there were none in production at the time to send him. When Nowicki Autosport finally started manufacturing carbon-fiber parts en masse, Bloomquist and Nowicki chatted extensively about the design direction for the black convertible.

"It was clear Jeff thought long and hard about every aspect of design—and he even steered me away from the original idea I had for the finish of the wheels," says Bloomquist. "In retrospect, he was 100 percent correct and I appreciated his candor and personal involvement."

Based on that counsel, Bloomquist asked Nowicki Autosport to handle the entire buildup of the car, shipping it from his Wisconsin home to the Detroit area for the work. Serendipitously, the car also served as the guinea pig for the company's next C7 component: leather-covered inserts for the convertible top tonneau cover. Like the other Concept7 parts, they proved devastatingly

effective, lending a more finished and refined appearance to the car when the top is down. Nowicki matched the color and material of the factory leather seat covers perfectly.

We stopped by with our cameras just as the finishing touches were being applied to Bloomquist's car, then cajoled him and Nowicki—with his original Concept7—into a blast up Woodward Avenue, in suburban Detroit, for some photos.

Greater track capability

The Concept7 portfolio of carbon-fiber parts includes a front splitter, rocker moldings, wheelhouse extensions, rear spoiler with adjustable wicker (also known as a Gurney flap), front fender vent inserts, rear fender intake ducts (coupe only), A-pillar, grille bar (it overlays the factory chrome bar), and a Targa-style roof bow. There's also a unique version of the hood, including the extractor, with exposed carbon fiber.

An OE-level supplier produces the parts for Nowicki Autosport, using lightweight, premium-quality 3K twill carbon-fiber material, along with vinyl ester-infused resin. That's industry-speak for carbon-fiber cloth with 3,000 filaments per strand and the classic, rich-looking layered twill pattern rather than a more basic—and cheaper—checkerboard pattern. And for those without a chemical engineering degree reading this, the vinyl ester-infused resin gives the parts exceptional strength and appearance attributes. They are clearcoated hand-polished, too, for that deep, wet look.

Although the A-pillar, grille bar, and vent inserts are strictly cosmetic enhancements, the splitter, rocker moldings, and adjustable rear spoiler were designed to balance their aesthetic appeal with a performance enhancement on the track.

The wicker on the rear spoiler, for example, offers 25 mm of vertical adjustment, enabling fine-tuning for the requirements of different tracks, while the wheelhouse extensions provide the necessary coverage for wider wheels and tires. The Concept7 cars Nowicki has built to date have worn 275/30ZR19 front and 305/30ZR20 rear Michelin Pilot Super Sport tires, all riding on custom HRE P101 19x9.5 front and 20x11 rear wheels.

That's a full 1-inch wider, front and rear, than the wheels used on the factory Z51 Performance Package. And compared with the Z51 package, the tires are 30mm wider in front and 20mm wider in the rear, giving the car noticeably more contact patch on the tarmac. Combine that with the downforce enabled by the splitter and rear spoiler and Concept7 promises to stick harder in corners than those speeding tickets in your insurance agent's computer.

For track driving, Nowicki uses Forgeline GA3R three-piece wheels—19x10 front and 20x12 rear—with Michelin Pilot Sport Cup tires.

Nowicki Autosport also worked with Hotchkis to develop a unique, adjustable stabilizer bar. Nowicki's car is also lowered in the front and rear. Retaining the stock springs and spring eye bolts and simply cranking them down as far as they would go did the trick. It's a surprisingly simple yet effective tip that gives the car a more aggressive presence.

"With more than 300 miles of track time, the Hotchkis bar has proved to be a great tuning tool that also provides the greater balance we were looking for on the track," says Nowicki. "We also change the factory Dexos motor oil to Mobil 1 15W50 for track days, which is recommended by GM."

Spending a session at Waterford Hills Road Course, near Detroit, we can attest to the enhanced grip the wider wheels and tires provide. It's deceptive performance, too. There's no body roll or protest from the tires, which are far from their limit at mostly posted speeds. A few minutes in, say, a Z51-equipped C5 will remind you how far Corvette performance has progressed and how much the right rolling stock will add to it.

The Concept7 also stops with physics-defying speed, thanks to a set of 380mm (15-inch) Brembo GT brakes, featuring slotted rotors, six-piston aluminum front calipers and four-piston rear calipers. As the original-equipment supplier to the C7, the company is in a better position than any other when it comes to upgraded brakes. The greater swept area of the approximately 10-percent-larger brakes (compared to the Z51 package) complements the car's greater cornering prowess. Like the wheels, Nowicki swaps out the street brake pads at the track, replacing them with Hawk DTC-70 and DTC-60 race pads. Take it from us, the Brembo brakes and Hawk pads work tremendously well. For safety's sake, there are also Sabelt lap belts and a harness bar.

The greater track capability of the Concept7 perhaps comes with the slightest of disadvantages: the wider wheels and tires increase rolling resistance, while the larger brakes add a few pounds of unsprung mass. It's not a huge issue, but with "only" 460 horsepower on tap, it's nothing another 50 or 60 horsepower couldn't fix—and that's exactly what Nowicki is working on. He's evaluating a heads-and-cam package to push the LT1 engine beyond the 500-horsepower mark. That, and a Corsa exhaust system to back the greater performance with the appropriate aural output.

"It's a natural extension of the Concept7 range and echoes the approach we did for a number of years with the C5 and C6 packages at Specter Werkes," says Nowicki. "Many drivers who use their car on the track prefer a stout naturally aspirated engine and that's what we'll focus on."

Despite requests from owners such as Bloomquist to build complete cars, Nowicki Autosport designed the components for individual sale and independent installation. They're all essentially bolt-on parts, but installation of some parts is more complicated than others. The rear spoiler, for example, requires removal of the rear fascia—although it bolts to the existing mounting positions for the factory rear spoiler.

"We're growing every day, designing and producing new parts and adding distribution for the products we use on our vehicles," says Nowicki. "It's been a fast ramp-up, but an exciting and fulfilling one, as the C7 Corvette has reinvigorated enthusiasts everywhere. It's the best Corvette ever and I believe we're doing our best work ever."

Indeed, Jeff Nowicki is proving he and his new brand will be inextricably linked to the Corvette and the enthusiasts who want to take what the factory gave them to a higher level. VETTE

Karl Dunn's '02 Z06 came to the party with all the right parts: Wilwood brakes, Forgeline wheels, Falken tires, JRi shocks, Lingenfelter engine bits, and suspension parts from Raft Racing and Van Steel. Karl knocked down a 14th place (1:49.119) on the road course and Sixth in the Speed-Stop (14.559) for a 14th place finish overall.

Cage Match

VETTES SLUG IT OUT AT THE 2014 OPTIMA ULTIMATE STREET CAR INVITATIONAL!

STEVEN RUPP WORDS | PHOTOS

Things aren't the way they used to be, especially at the Optima Ultimate Street Car Invitational (OUSCI). At the inaugural event in 2008 there were around 30 cars driven by your average car guys and gals. It was really grassroots. Over the years the cars have evolved and the quality of drivers has really escalated. The event even managed to outgrow its longtime home at Spring Mountain Motorsports Park in Parump, Nevada. The new venue is Las Vegas Motor Speedway, which let Optima Batteries more easily host the hundreds of people that wanted to come out and catch the action.

Every year the rules are tweaked a bit, but in general they carry over from the previous year's OUSCI. The three driving events were scored using a points system where the top finisher was awarded 25 points, down to a single point for finishers of 20th or lower. In the Lingenfelter sponsored design competition, up to 25 points could be had. This meant the cars had to consistently perform in all four challenges to win the overall prize.

Another way to pick up points was in the Detroit Speed Inc.-sponsored road rally.

The venue might have been new, but the basics remained the same and that included the ritual of the Saturday morning driver's meeting. Rule number one was safety and rule number two was to have fun.

OK, one cool deal that the Optima organizers arrange are for umbrella girls to shade the drivers as they wait in the staging lanes. Let us tell you, nothing makes you feel more like a real racer than a pretty young lady shading you with an umbrella.

Brian Hobaugh was almost knocked out of the competition when a halfshaft broke, taking out his upper shock mount. Fortunately, other racers, including techs from Detroit Speed Inc., helped get the mount welded in place and the car back on track.

This year it was actually a series of road rallies where drivers could garner a maximum of 25 points. Miss these points and there's really no mathematical way you can do well in the event. After all, these are supposed to be street cars, so they should be able to drive around town without issue.

The Hot Lap Challenge consisted of three sessions where groups of cars were sent out on the 2.4-mile track. This was a big departure from previous years as cars could pass in designated areas since there was considerable traffic. The first session ran in a random order, but subsequent sessions ran with the fastest qualifying car going out first. With over 100 cars, the Hot Lap Challenge sucked up all of Sunday.

The Street Challenge Autocross was also changed up quite a bit. Two cars were run at the same time (think drag race) on two tracks that roughly mirrored each other. Even though the cars were really racing the clock it did make it much more interesting for the fans. Competitors had to make five laps on both tracks and then the top time on each side were added up. Hitting a cone, no matter how much it teased you, resulted in a 2-second penalty.

Lingenfelter sponsored the Performance Design Competition where cars were judged much like they would be in a car show. After all, this isn't about shoddy-looking pseudo race cars, it's about finding the "ultimate street car" and that ride should be nice looking as well.

In the Wilwood Brakes-sponsored Speed-Stop Challenge, drivers combined launch speed with handling and braking prowess to traverse a given distance, negotiate a slalom, and stop in a coned-off box. Even touching a cone in the stop box earned a DNF. It's a tricky event that really favored the ABS-equipped cars. The trick here was to not flat-spot your tires, which would make the road course tough since drivers run the same set of tires the whole event.

The '12 Grand Sport piloted by Duke Langley ran strong all weekend, finishing in 20th in the Hot Lap Challenge (1:50.199) and 7th in the Street Challenge Autocross (42.897). Those, combined with his 25th place finish in the Speed-Stop (15.168), helped secure his 16th place overall finish.

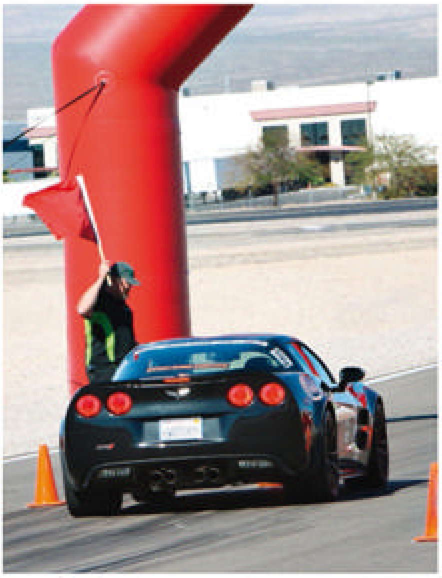
Todd Rumpke killed it on the road course where his 1:46.717 lap was good enough for Fourth place. That, combined with a 14th place Speed-Stop, and 18th place autocross, landed him in Ninth place overall; quite an accomplishment given this year's level of competition.

Rick Hoback ran his heavily modded '99 FRC hard all weekend and even though he finished mid-pack, he had a blast using his Corvette as God intended.

One of a handful of female drivers was Jane Thurmond in her badass '64. Like many of the other classic Vette drivers, she landed mid-pack (47th). The autocross was her strongest event (38th) where she bested some pretty serious competition.

The competitor's best time in each event was used to determine how many points they would accumulate. There are lots of other rules, like the car having to be displayed somewhere at the 2014 SEMA Show, and there were a host of safety gear regulations. The biggest rule was that the tires had to have a treadwear rating of 200 or greater. Lastly, all of the cars and trucks had to pass a technical and safety inspection that included "street" items like blinkers, brake lights, and windshield wipers.

Now, the subject of drivers is fraught with controversy. After all, if they really wanted to find the fastest car they need to have the cars driven by a selected hot shoe. With over 100 cars in the field that would be one tired person by the end of the day. Not very practical either, so the cars are all piloted by their owners or by



The Wilwood-sponsored Speed-Stop Challenge was a very interesting deal. Cars had to launch, accelerate down a straightaway, run a slalom, and then stop in a coned-off box. Hitting any of the cones resulted in a DNF. This timed event certainly favored ABS-equipped cars like Mike McClish's '12.

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the person that built at least 70 percent of it. But, that's more of a guideline than a rule.

This year there was a lot of pressure put on the domestic cars by the imports. Yeah, we like to poke fun at the "ricers," but let's face it; a heavily modded AWD Mitsubishi EVO or Nissan GT-R is a really fast ride, especially on a tight autocross track or in an event like the Speed-Stop, which emphasizes launching and braking.

After two days of slugging it out, a Corvette came out on top, but not by much. In fact, out of the top 20 cars, 11 were domestics, and all them were Chevys except one. The way things keep escalating we can only imagine what a cage match next year will be. VETTE

One of the nicest cars at the event was Alan Palmer's full-custom '59. In fact, his very strong finish in the Style and Design segment helped him finish 51st out of the 100-car field. And, while he didn't finish high in any of the driving events, we were very impressed that he beat on such a high-end show car so hard.

Another Vette that scored high in the Style competition was Dan Livezey's '64. This car was nice enough to win any car show and it had the performance to back it up. Dan ran a 1:54.292 on the road course (34th) and managed a 15.005 in the autocross (17th). When the numbers were tallied up he landed in 26th overall, in between a pair of Nissan GT-Rs, which is pretty damn impressive.

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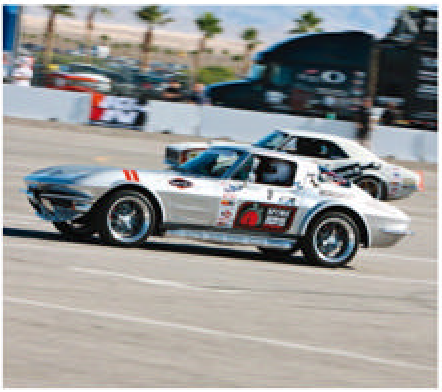

Quite a few vintage Corvettes were running in the event alongside their technologically advanced cousins. This LS-powered '63 was driven by Jeff Montgomery, and his stunning mid-year finished in 49th overall. Higher than some pretty stout cars, like a Mercedes SLS, a pair of GT500 Mustangs, and a 911 Carrera.

We're sure it was purely coincidental, but the Air Force base next door to the track was having their annual air show the same weekend. Hey, we certainly didn't mind the mix of high-performance air and ground machines.

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(Above) Brad Yonkers in his Z06, powered by a 450hp LS6, pulled off a 28th place finish in the Hot Lap Challenge and came in 41st overall in his '02 Z06. "No event I've ever been to had such a large variety of makes, models, and years. The competition was far tighter than I expected," recalled Yonkers. After the event he drove the Corvette over 2,000 miles back home to Michigan.

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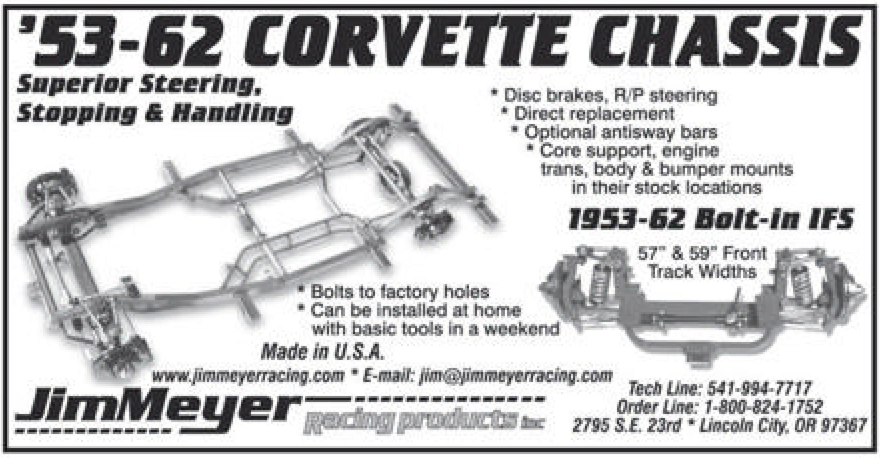

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(**Below**) Last year's winner, Brian Hobaugh, found this year's competition even tougher, but he still managed to wheel his '65 Vette to a Sixth place overall finish. Actually, his was the only car older than a 2000 model in the top 12, which is certainly something to be proud of. It didn't hurt that he pulled off a Third place finish in the autocross event.

At the end of the weekend Danny Popp found himself, once again, in the top spot. His '03 Vette was set to kill and his standings of First on road course (1:43.593) and Second in the autocross (41.832) were big factors in his overall win. But it was close since he won by only 0.467 points. Congrats to Danny ... once again!

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TWO FOR THE ROAD

JEFF GOLDSTEIN LIVES THE DREAM IN A PAIR OF SWEET C2S

JOHN MACHAQUEIRO WORDS | PHOTOS

Trends in the car hobby seem to always be in a constant state of flux. This is certainly the case in the Corvette universe. If you're on the hunt for an older model, you may likely have some tough decisions to make when cutting a check. Whether you want to build a restomod, vintage racer, or do a full-blown NCRS level restoration—or anything in between—it inevitably comes down to finding the right car, and making the right personal decisions.

For Rhode Islander Jeff Goldstein, that decision-making process started back in 1986. At that point in time, all he was looking for was a nice Corvette driver to enjoy. Word of mouth led him to the '66 Silver Pearl

Metallic C2 convertible that you see. An original 327-cubic-inch/350-horse engine, four-speed car, it scratched that Corvette itch for many years. As a result, it saw plenty of road time and delivered many happy miles. As the C2 love affair progressed, Jeff grew his knowledge base of all things Corvette. He gradually became aware of the efforts of the National Corvette Restorers Society (NCRS), and their dedication to the restoration, preservation, and history of the Corvette brand. Armed with that knowledge, he slowly tried to rectify his '66. "As I learned what was incorrect, I attempted to change it back as much as I could to what was correct," he explains. When he purchased the car, the claim was that it was a fresh restoration. He now describes it as a "coffee can restoration. Nothing matched. Everything got thrown into the coffee can. Whatever screws fit, that's what got used."

After 25 years of regular use, Jeff decided the old girl needed to be freshened up. With so many years behind the wheel—and the understanding of what his car realistically was—a change in build direction was made. "It was never going to be an original car," Jeff candidly admits. "There were too many parts that were missing and not enough history to have it be considered an NCRS Top Flight car, so I decided to make it into the car that I would have ordered myself."

Xtreme Restorations in Slatersville, Rhode Island, was handed the job of giving the '66 a full makeover. Once they started ripping into the body, the car began to shed some light into its past. Inside, they found numerous holes in the floor where it appeared that a rollbar and oversized fuel tank had been installed. When the body was separated from the frame it gave up even more secrets. At some point, the frame had been seam welded and had gussets added, as specified in the Chevrolet Power Service Manual. This type of modification was commonly performed on cars destined for aggressive road course action. These alterations pointed to the likelihood that, at some point, this Corvette saw some track action.

As a result, questions popped up as to what they would find once they started to peel back the silver paint. Underneath, they found a layer

of Milano Maroon, a layer of non-GM green metallic, and the original layer of Silver Pearl Metallic. What was surprising was the exceptionally good condition of the fiberglass body, taking into consideration the assumed road race background.

With the C2 torn apart, the crew at Xtreme began the restoration process by performing minor repairs to the body and fine-tuning all of the body gaps and body lines. After it was razor sharp, they laid down a fresh basecoat/clearcoat of Silver Pearl Metallic. They also modified the driver-side floor. Jeff explains, "Standing 6-feet, 5-inches, I'm tall, and being comfortable in the car was a high priority." The shop accomplished this by cutting the pedals about 1 inch below the hinge point under the dash, and then welding a horizontal piece extending rearward. The cut off pedal was then welded to that horizontal piece, so the hinge point remains the same, but the pedal location is farther back. In addition, they also moved the toeboard out 2 inches closer to the front tire. These mods allow him to operate the pedals without his knees hitting the steering wheel.

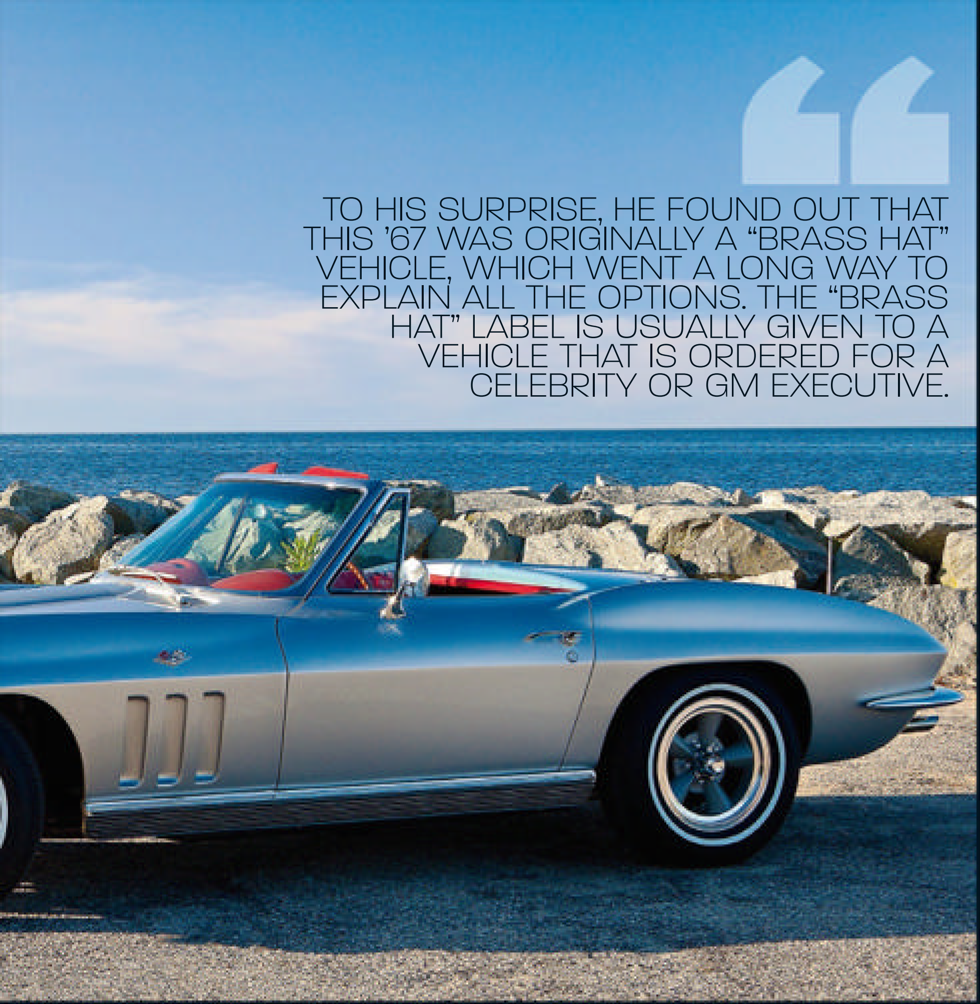
When it came time to replace the interior Jeff opted for red leather instead of the original black vinyl. He also wanted some creature comforts installed, like air conditioning and power windows. While the windows were not an issue, tracking down an original '66 A/C unit proved to be a challenge. After months of searching, he found a complete, functioning unit in Hawaii.

Unlike the custom work being performed on the body, everything that was rebuilt or replaced on the drivetrain was put back to factory stock as much as possible. The NCRS influence in that decision was clearly at play, however, the red cloth top and period-correct Keystone five-spoke mags wrapped in 15-inch whitewall radials were very much a personal statement.

The end result was a much more comfortable car to drive that still retained the essence of a stock C2 that rolled off the assembly line in 1966. Validation for his efforts, and the quality workmanship from the crew at Xtreme, came when the Corvette debuted at the 2010 Detroit Autorama and was awarded 1st Place, Class Winner for Modified Sports.

Sharing the stage with the '66 is the Rally Red '67 convertible seen here, too. Unlike the '66, it has no skeletons in its closet. Purchased in 2011, this Corvette was the fulfillment of a dream. "I thought I knew what I wanted," Jeff admits. "I realized that I probably wouldn't locate a 'barn find' and probably couldn't afford a low-mileage original Corvette, so cars like that weren't part of my equation. Instead, I tried to find the most affordable and original small-block '67 convertible with air conditioning, four-speed, and red interior. Was I asking too much?" Apparently not. Through the magic of the Internet, he located

> TO HIS SURPRISE, HE FOUND OUT THAT THIS '67 WAS ORIGINALLY A "BRASS HAT" VEHICLE, WHICH WENT A LONG WAY TO EXPLAIN ALL THE OPTIONS. THE "BRASS HAT" LABEL IS USUALLY GIVEN TO A VEHICLE THAT IS ORDERED FOR A CELEBRITY OR GM EXECUTIVE.

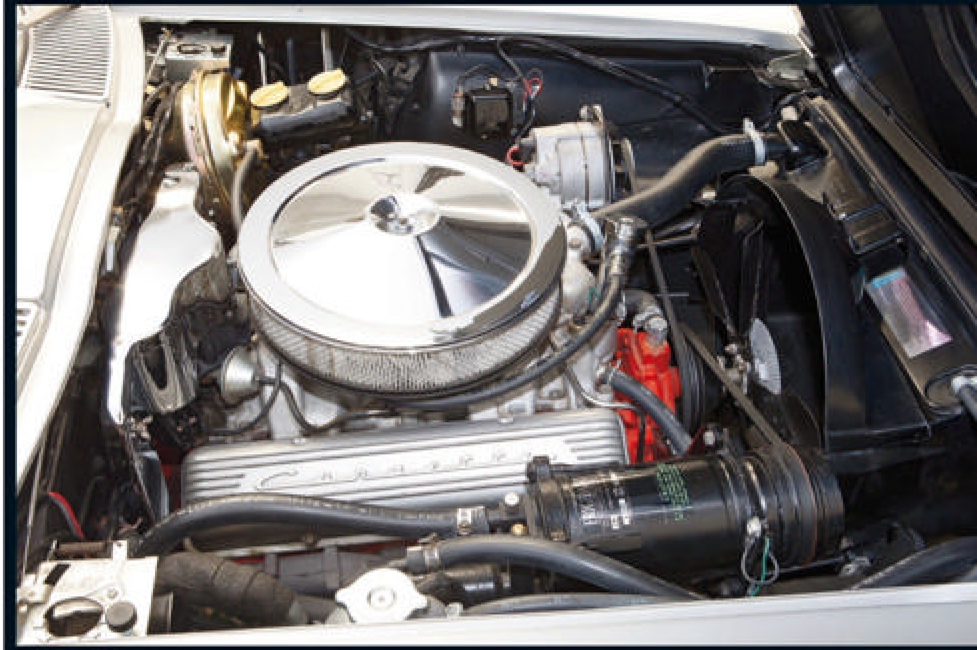


this C2, which fulfilled his wishes. It was listed as having had a recent body-on chassis restoration and an immaculate original interior. In equally superb condition was the paint, even though it wasn't original. Overall, it was in many ways, a very solid car, or as Jeff likes to describe it, with "good bones." In terms of options, it had just about every luxury accouterment you could order on a '67 Corvette. It was also fully documented; something that was lacking in the '66. Since this car was an open book, Jeff felt that it was an excellent candidate for an NCRS Top Flight award.

The folks at Xtreme Restorations were again asked to perform their magic on this C2. Their challenge was to restore the car back to its day one condition, as it rolled out of the St. Louis assembly plant in 1967. While the car was well on its way to fulfilling many of the NCRS criteria at the time Jeff acquired it, there were still numerous things wrong with it. At some point, the 327-cubic-inch/300-horse engine had been dressed-up with an aluminum intake and valve covers to make it look like the 350-horse version. This meant finding the correct, date-coded parts, which became a part-time job. He also took the opportunity, while that work was being done, to pull the engine and have a complete rebuild done.

Part of the process with this car was to also use the original documentation, which included copies of all the previous titles, as a means to track down past owners. To his surprise, he found out that this '67 was originally a "brass hat" vehicle, which went a long way to explain all the options. The "brass hat" label is usually given to a vehicle that is ordered for a celebrity or GM executive. A St. Louis Chevrolet sales zone manager ordered this particular car. The NCRS records verified that it was delivered to Dagley Chevrolet in St. Louis. The paperwork also showed that the sales manager only used it for about three months, at which point it was sent back to the dealership to be sold as a used vehicle. Up until Jeff purchased the car, it had spent its life in the St. Louis area, with one family having owned it for over 30 years.

After Xtreme completed the work, Jeff had the car NCRS judged at the local, regional, and national level, where it scored 97 points or better, giving him three Top Flight awards. "Having my car judged at several NCRS events gave me an education," he points out. Part of that education was the realization, as was the case with the '66, that sometimes when attempting a restoration, it doesn't need to be to an NCRS level. "It's easy to let your passion for a Corvette leave your common sense and good judgment behind," he explains. "I think you have to be pretty smart, patient, and very well prepared, or be very lucky when buying and restoring a Corvette." With both of these C2s, Jeff managed to cover all the bases and make the right choices to fulfill his dream. **VETTE**



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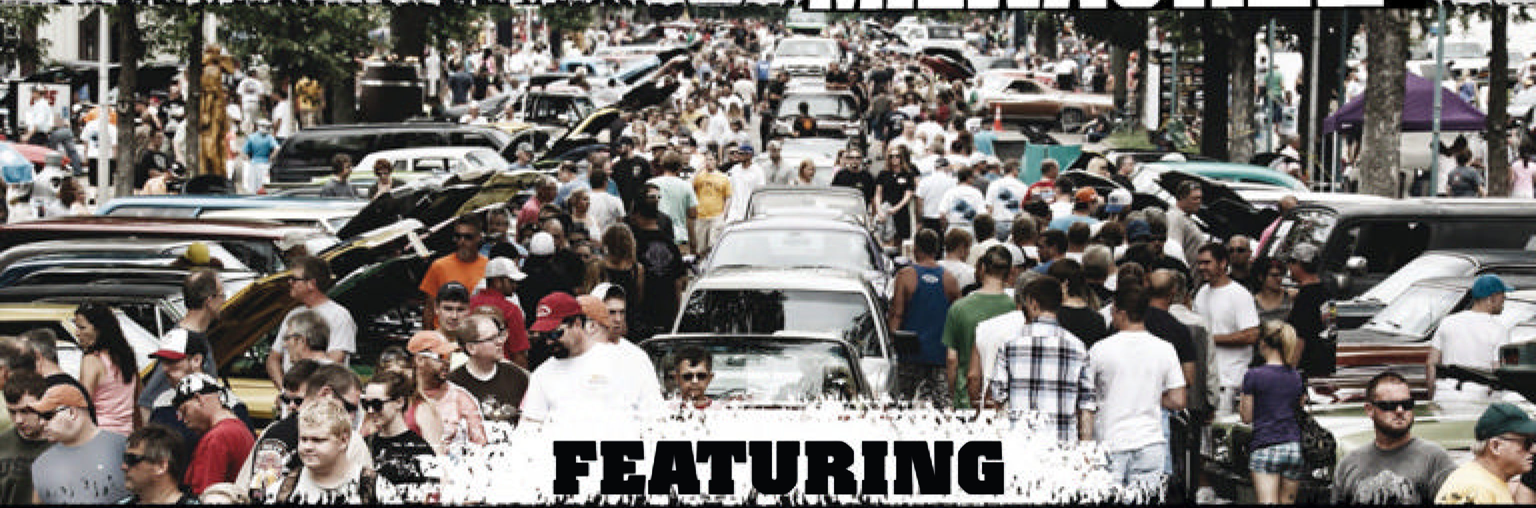

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REBUILDING PROJECT SCARLETT'S TILT/TELESCOPING STEERING COLUMN

JEREMY D. CLOUGH WORDS | PHOTOS

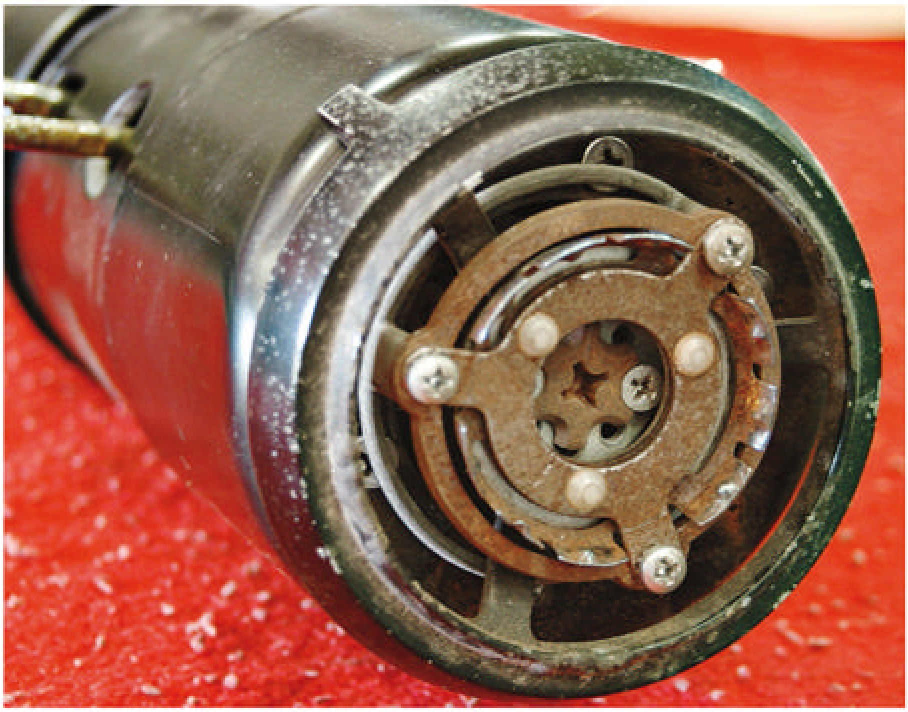
One of the most important interfaces between the driver and car is the steering wheel. It's where your hands go, what you clutch madly in wild-eyed terror when you don't have seats that hold you firmly in place during hard cornering, and what generally controls the trajectory of your Corvette (hooning notwithstanding). The good news is that Scarlett came with a tilt/telescoping column that easily adjusts to the desired hand position and also makes it easier to get in and out over our well-bolstered Corbeau seats. The bad news is that time did the same things to the column that it did to the rest of the car, and the laser-sharp steering we expect from the steering rack we'll be installing will be lost in the slop and play of the well-worn steering column. Having looked online for a shop that specializes in rebuilding them and finding only vague results, we sourced a rebuild kit from Paragon Reproductions and dug in ourselves.

Word to the wise: this is not for the faint of heart. Of all the things we've done to our beloved Shark, this was one of the most detailed. We'll give an overview here, but to do it yourself, lay aside the Haynes manual and the assembly book. You'll need the detailed GM Service Manual and a few specialized tools. Paying close attention to the instructions, though. With unfettered access to the full array of tools available at Tray Walden's Athens, Alabama-based Street Shop, Inc., we managed to get the column rebuilt in about a day's work, not counting time to let paint dry. Assuming you have all the parts on hand, it's basically a weekend project.

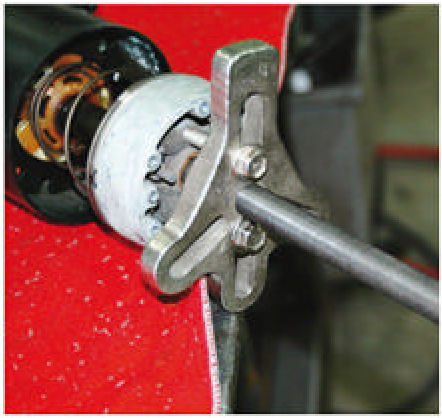
Some of the column rebuild can be done in the car, but not all, so the first order of business is to unplug the wiring from its plug on the column, back out the assorted bolts holding it in place, loosen the rag joint, and pull the column away from the firewall and up and out of the car. We had already removed the seats and other dash components when we pulled the column, but if you still have those in place, they should probably come out, too.

The first order of business was to pry off the center emblem/horn button and remove the wheel. Since GM steering wheels from that era tend to be slick at best and sticky at worst, we boxed the wheel up and shipped it to Chuck Pelton to have it leather-wrapped. Since Scarlett is being built for track duty we had a white "straight-ahead" band stitched into the black leather covering—not something they usually do—to give us a vague idea which way the wheel is oriented during high-speed cornering.

In addition to having the wheel redone, we also replaced the turn signal, tilt lever, and hazard knob with new ones from Corvette America to match the new horn button, and replaced the keyed part of the ignition assembly. If you'll be working in a compressed time frame, as we were, there are several other parts you may want to have on hand, including the seal that goes between the lower column bracket and the firewall and the ignition switch itself, which is mounted lower on the column. While ours worked fine, its finely rusted appearance wasn't quite up to par—and this deep into a rebuild, there's no sense in putting 40-year-old electrical components back in. Other parts to have ahead of time are



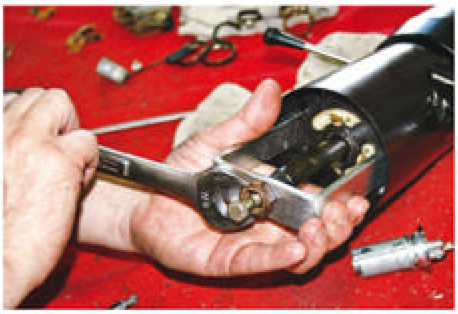
01 **The steering wheel has already been removed in this photo, but this is what will greet you when you pry off the horn button. The horn contacts will have to be removed, as well as taking out the star screw and the two screws that hold it in place, all fairly easy screwdriver work.**



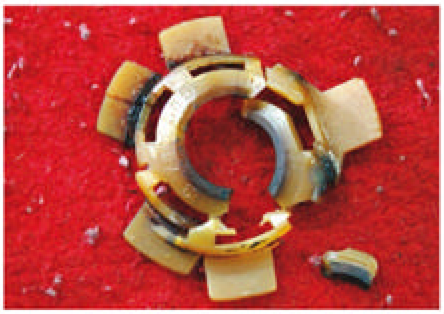
02 **After removing the upper horn contact, star screw, locking lever, and other assorted goodies, we used a steering wheel puller to remove the hub from the steering shaft. Note the pale plastic C-ring retainer in the background, which gave up the ghost during disassembly.**

the plastic rivets that hold the collapsing inner steering shaft into its jacket and the plastic C-ring retainer, which ours more or less disintegrated on removal.

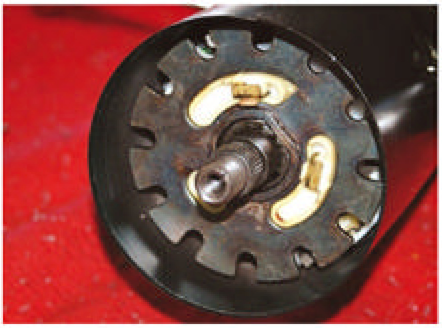
Prior to reassembly, we also bead-blasted and repainted all the external parts in the appropriate black. Word to the wise: GM used pot metal for the castings, and they have plenty of voids that blasting will only open up. Bead-blast it as lightly as you can and still have a good surface to repaint. **VETTE**



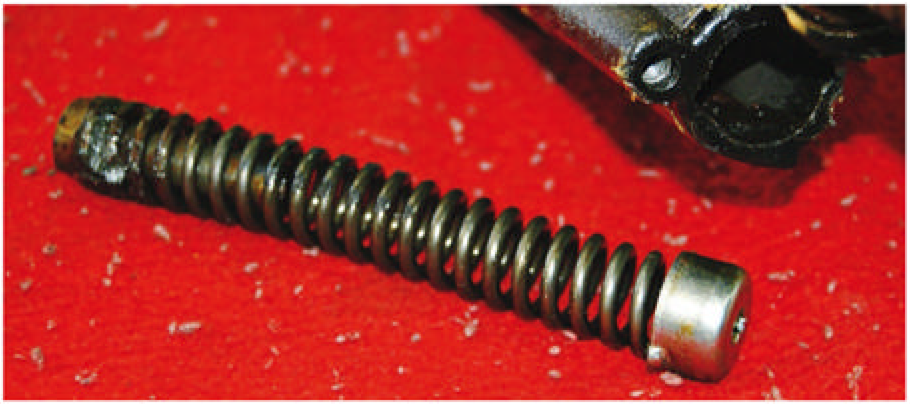
03 **Called Tool J-23653 in the service manual, this tool is used to compress the spring that pushes the toothed lock ring up against its C-shaped retainer so the retainer can be removed from the steering shaft and the lock ring slid forward and off.**



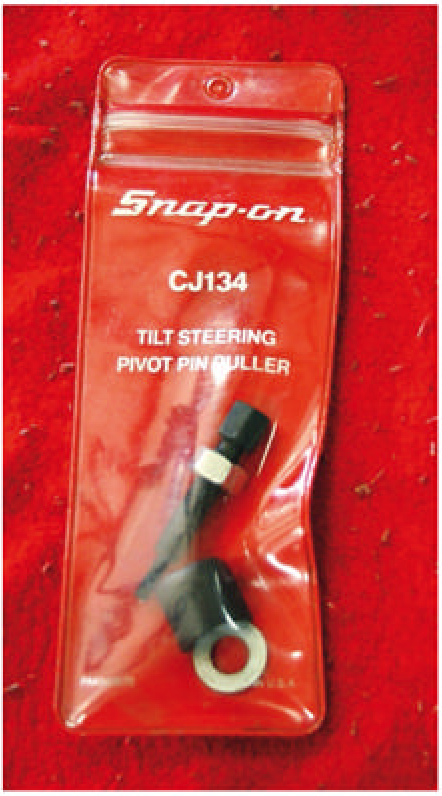
04 **The plastic C-ring retainer covers the retainer that keeps the toothed lock plate in place. Ours turned out to be hopelessly fragile: this is the way it came out, to be replaced by a new one.**



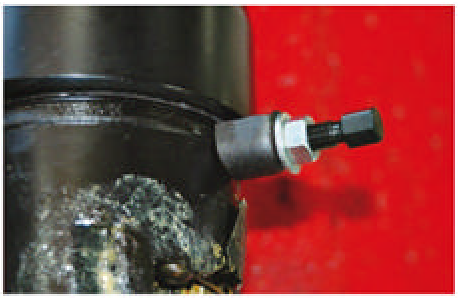
05 **The locking ring seated on the plastic horn contact carrier, which slips into place in front of the turn signal switch. Once we removed this, we could unscrew the old turn signal switch and carefully remove its wiring from where it passes through the turn signal housing.**



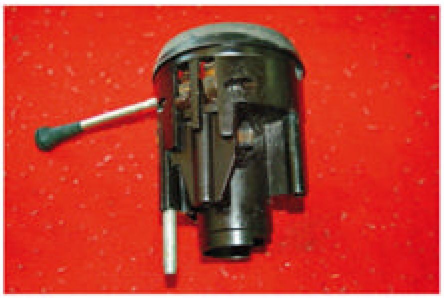
06 **Once the turn signal housing was removed from the column, we started on the bearing housing, which requires removing the tilt lever spring. It's held in place in the bearing housing by its cap. Compress it with a screwdriver and turn to free the locking tabs from their slots, so the retainer and spring can come forward out of the housing.**



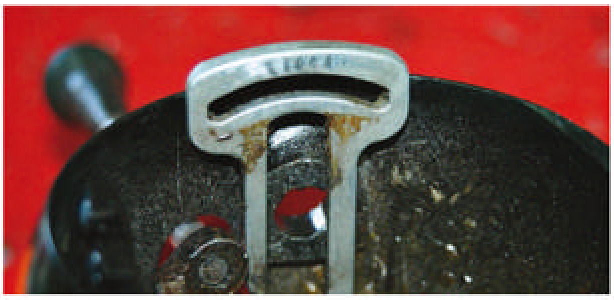
07 **To free the bearing housing on a tilt/telescoping column, you'll need a pivot pin puller to remove the pivot pins without tearing things up. Called Tool J-21854-1 in the assembly manual, we sourced this one from Snap-on.**



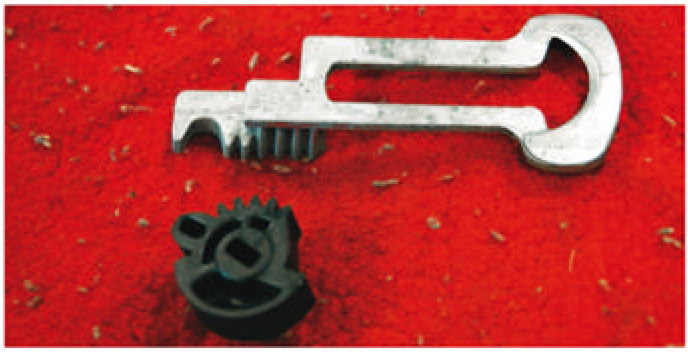
08 **The pivot pin puller installed and doing its magic. Once the bolt is screwed into the pivot pin, tightening the nut uses the bolt to draw the tightly fit pin out of its seat.**



09 **Here's the bearing housing after being freed from the rest of the column. Among other things, this assembly contains the linkage required to make the ignition switch work.**



10 **The ignition switch rack, seated in place in the bearing housing. This end connects to the ignition switch rod, while the other end mates with the sector gear that rotates when the ignition key is turned.**



11 The new ignition switch rack and sector gear that came with our rebuild kit. The slot in the sector gear turns with the ignition lock cylinder. When the key is turned, it rotates the gear, which then moves the rack, which moves the rod that turns on the ignition switch.

O beautiful.

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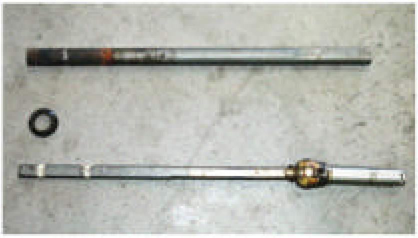
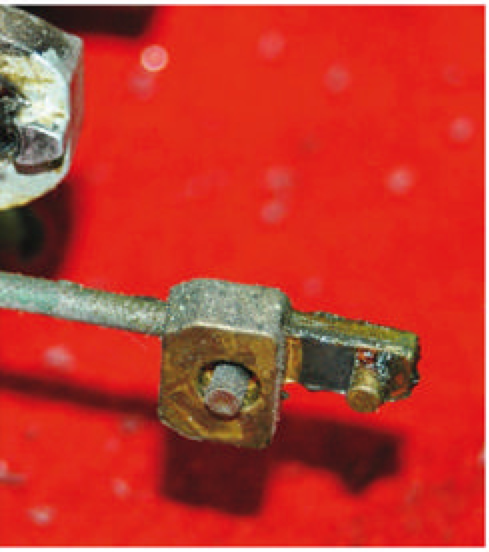
12 The ignition switch rod protruding from the turn signal housing. It connects the ignition lock cylinder with the switch itself, which is located lower on the column. The stud on the end of the rod has to be seated in the slot on the end of the ignition switch rack.

13 With the top half of the column apart, we moved to the bottom, and started by removing the lower bearing adapter so the steering shaft/jacket can be removed and the bearings replaced. The inner race of the bearing was frozen to the jacket and required more than a little force to get it off so the shaft assembly could be removed.



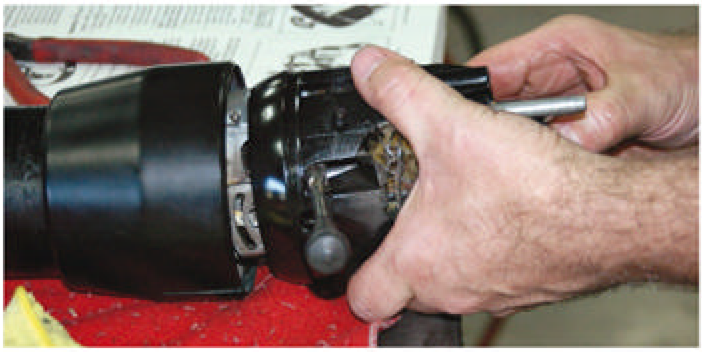
14 All Corvettes of Scarlett's vintage came with energy absorbing steering columns that have a steering shaft (bottom) that can collapse into a jacket (top), and is held in place by the white plastic rivets visible on the shaft in the left side of the photo. Since there's a good chance these rivets may be damaged during disassembly (ours were), it's wise to have new ones on hand when starting the job.



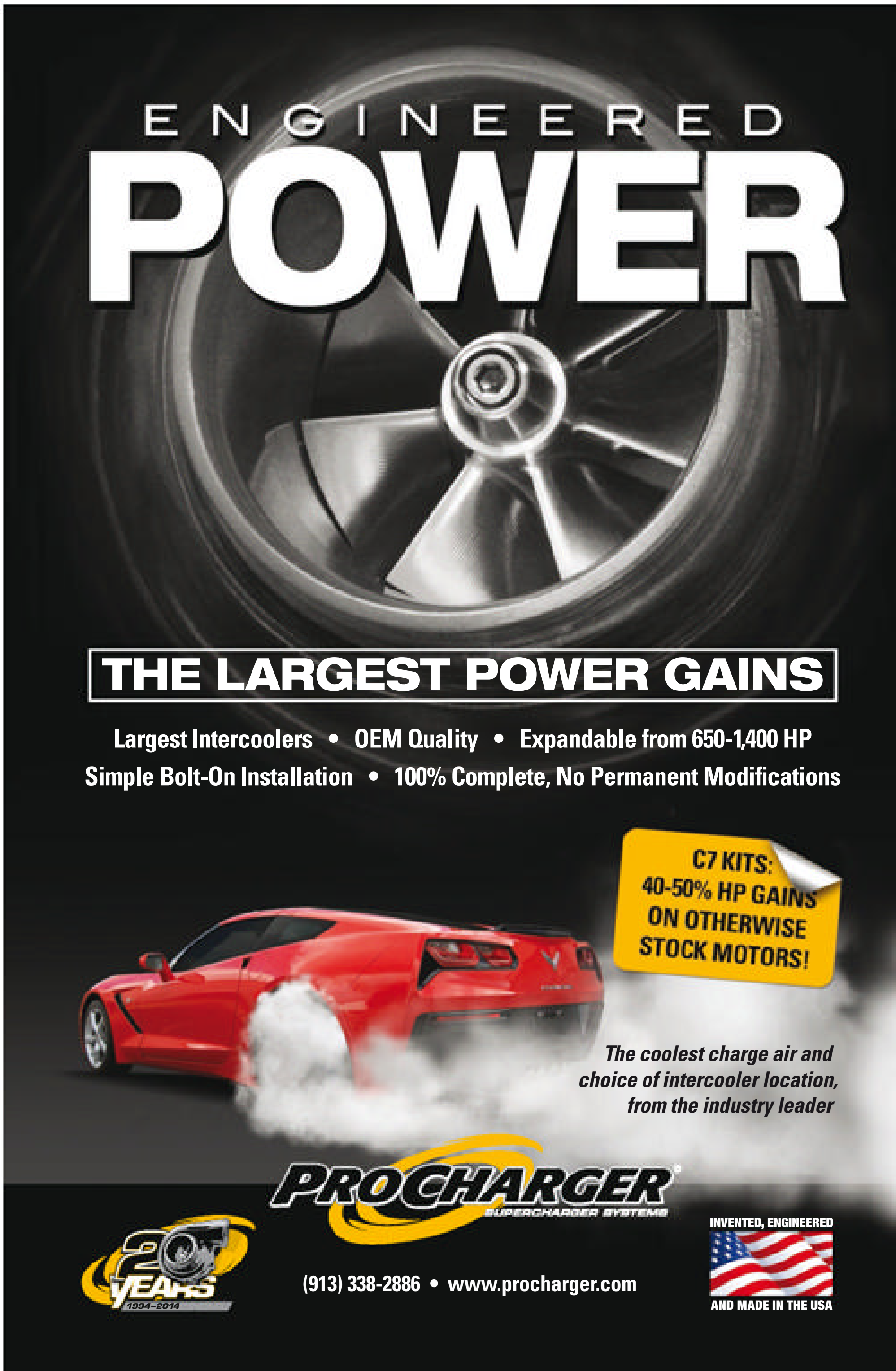
15 Greasing the steering shaft joint prior to reassembly. Called the "centering spheres," this part of the column functions much like a universal joint between the upper and lower steering shafts to let the tilt function work while still allowing the steering shaft to turn.

16 Installing a new lower bearing on the steering jacket, which, along with the rest of the column, has been blasted and painted. Note also the white plastic bearing adapter, which will need to be in place before the bearing goes on.

17 The lower bearing in place, with the bearing reinforcement slid in place behind it and clipped into position.



18 Seating the bearing housing back into the column. Note the slot in the ignition switch rack. This has to stay oriented with the end of the ignition switch rod, or nothing happens when the key is turned ... if it goes together at all.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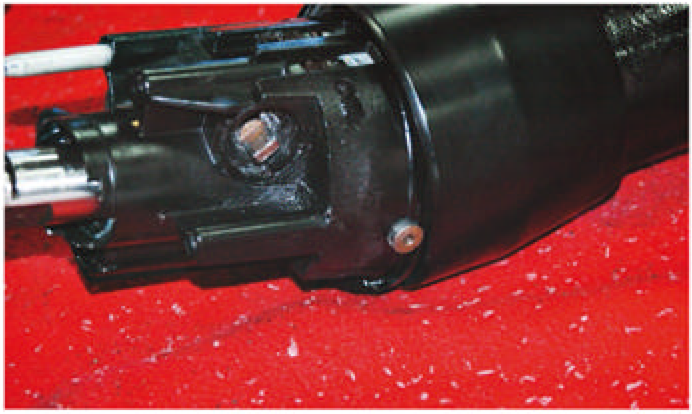
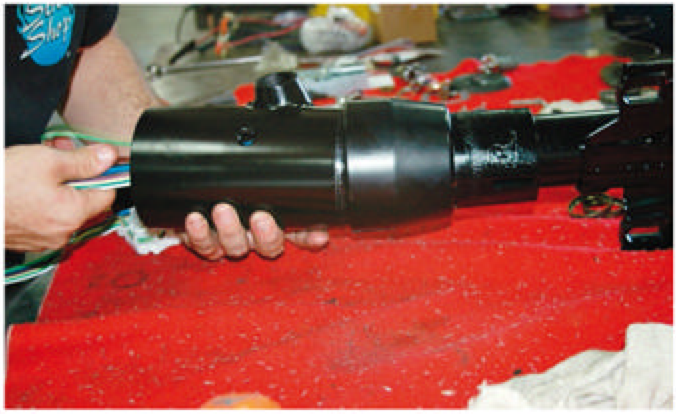
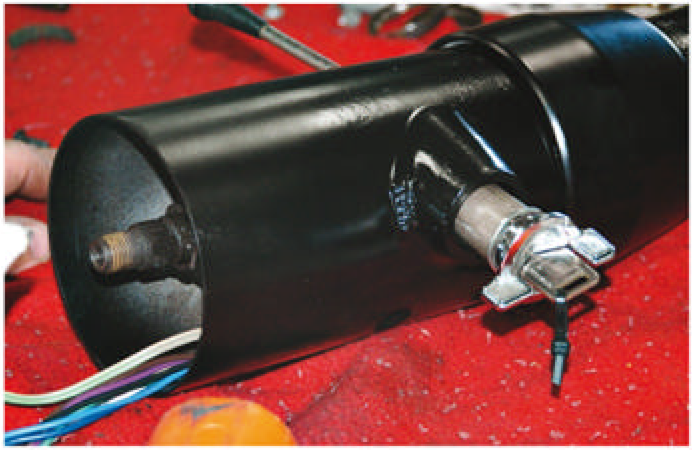


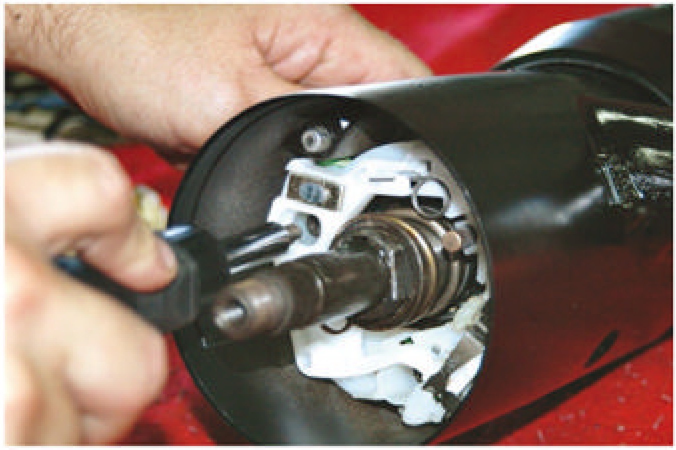
19 The bearing housing being installed. Note the pivot pins, which are driven back into place with a ball peen hammer and drift.



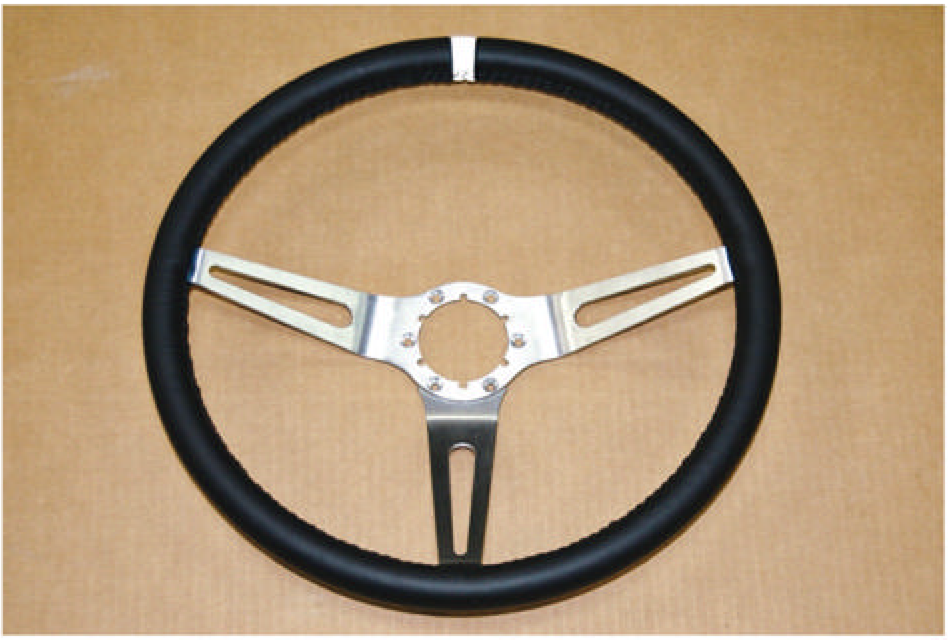
20 Once the bearing housing is back in place, the turn signal housing can slip over it. Before installing the turn signal switch, the wires have to be routed carefully through the housing. Wrapping them in tape or something comparable is recommended.



21 This is also when the key switch goes back into place. Make sure the ignition buzzer switch is properly installed, as it'll need to be in place before the key switch is seated.



22 Screwing the new turn signal switch in place. Once you're to the point where you can turn the steering shaft, install the turn signal lever and check to make sure that the switch works both ways and that it cancels when the shaft is turned.



23 The visible part of the job is our newly leather-wrapped steering wheel, which was redone by Chuck Pelton. Since Scarlett is destined for the track, we had a contrasting strip of white leather sewn into place as a "straight-ahead" band, which can be useful for high-speed cornering.

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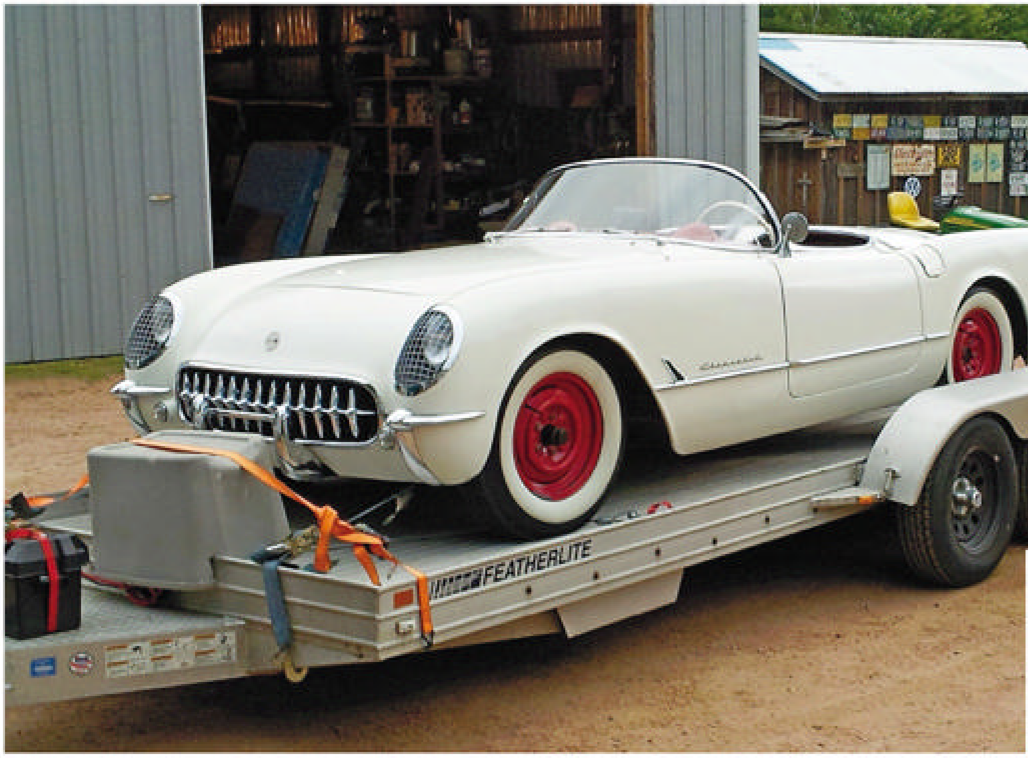


Finding an unrestored original '54 model with a one-owner history is almost impossible today. Brown's '54 ranks as one of the great survivor Rare Finds ever.

ONE OF THE GREAT EARLY SURVIVOR VETTES OF ALL TIME

Bob Brown was very disappointed he missed out on an "in pieces" '54 Corvette—the '54 from last month's column. Readers may recall Larry Fisette found said '54 stored in a garage in Sturgeon Bay, Wisconsin, for 40 years. Little did Brown realize that Fisette already had a lead on another '54 that would prove to be one of the great survivor Corvette finds of all time.

Two weeks passed when Fisette called Brown. Fisette was going to look at a '54 Vette stored not far from Marion, Indiana. "Any chance I could go with you?" Brown asked. "Sure, why would I want to go by myself?" Fisette replied.

Brown grew up in Muncie, Indiana, about 30 miles from their destination. Hunting old cars is SOP (standard operating procedure) for Fisette. "The best car finder I have ever known," Brown told me. Fisette's major claim to fame was the stash of 21 semi-trailer loads of vintage cars and parts, including engines and a real Yenko Camaro.

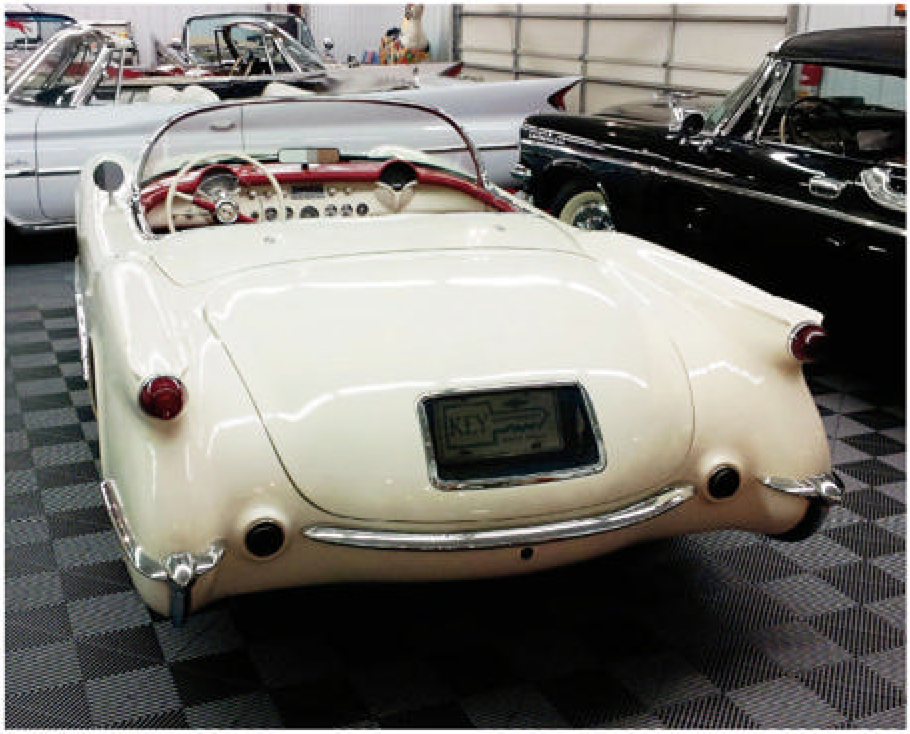
Brown was pessimistic as the pair embarked on the 7-hour drive from Fisette's De Pere Auto Center in De Pere, Wisconsin, to Indiana. "I told Larry how it was likely not a good car and if it was I possibly could not afford it." Fisette, the veteran car hunter, just smiled and kept driving. Unbeknownst to Brown, Fisette had already made a deal with the owner if the car checked out. The '54 "ended" on eBay, so Fisette called and negotiated. The owner wasn't traveling from Florida to Indiana for nothing. He had inherited the car from his grandfather, the original owner, a Mr. Raymond Marchi of Revere, Massachusetts.

Upon arrival, the two men found the '54 had been parked in a storage trailer inside a barn, "some year's before Mr. Marchi's death in 2010." The '54 was obviously unrestored and original. The body still wore its original white lacquer paint. Brown was intrigued to see original gas stains below the fuel filler door. "We hooked up a battery and hit the key. The engine turned over." The '54 was turning out to be, in Brown's words, "a pretty solid citizen."

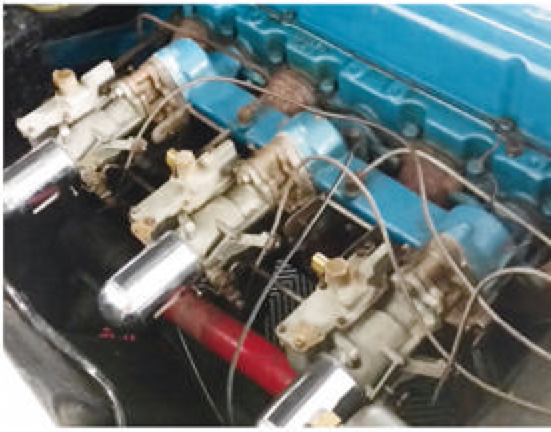
The odometer read in the low 50s, the convertible top was shredded, and the brakes didn't work. These features actually endeared Brown to the car. Here was a '54 that the original owner drove and loved and kept in good running order. The more Brown looked at the car, the more he liked what he saw. "We got a whole packet of information showing Grandpa driving the car with his grandson who looks like he is maybe 7-8 years old. He's the guy we bought it from."

A newspaper article dated February 1954, showed a picture of Marchi accepting a key from the Chevrolet dealer. The caption said, "First Chevrolet Corvette sale" in Waltham, Massachusetts, at West End Chevrolet. The '54 included original owner manuals, the 1,000-mile warranty and the registration number, and the Delco battery warranty for the original battery.

"The car's serial number is 1149, which



"We eventually cleaned most of the dirt and grime off it and it is a real nice, clean original car. Even the medallion on the front is faded and looks like it could be replaced with a brand-new one, but, it's the original one." Brown looks back into history when he analyzes his '54 Rare Find. "The taillight assemblies, where they epoxied them to the body, has a little line all the way around the taillights on both sides. That's the way GM did it. The body parts are somewhat poor fitting and the glued taillamp assemblies are just exactly the way the cars were manufactured."

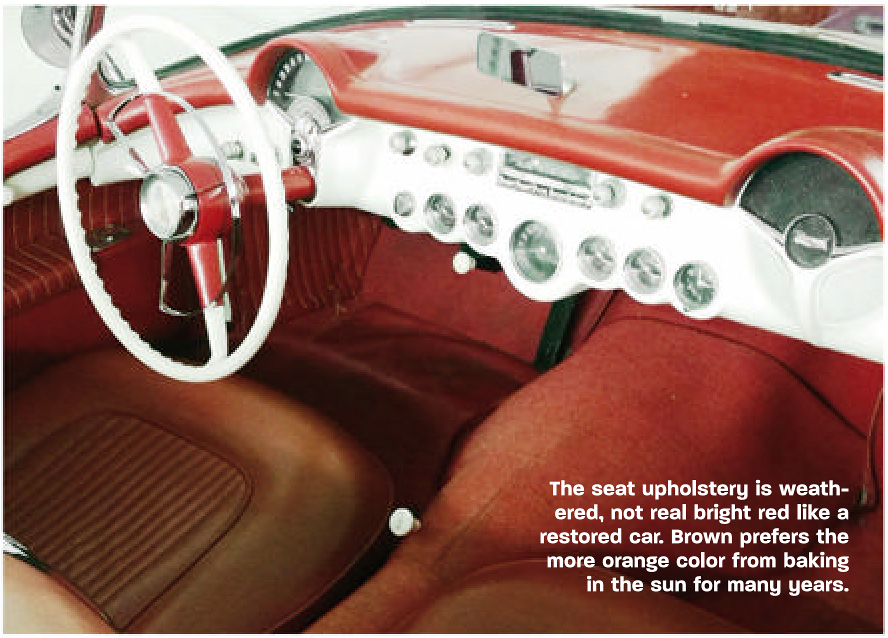


The engine bay is cryptic nirvana; "even the carburetors have late 1953 tags on them."

Brown received a box full of original documents, including this original "Corvette Owner" card that included the serial number of the car – E54S001149.

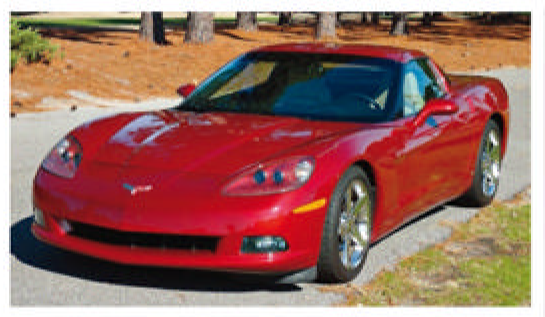
means it was the 149th Corvette made in 1954. So, it has the early bullet air cleaners instead of the dishpan air cleaners. It has the real short exhaust pipes instead of the longer ones because they hadn't figured those problems out yet," Brown recalled. He went on to say, "Even the carburetors have late 1953 tags on them. And the seats have the little tags under the upholstery that show they were manufactured in 1953 by the supplier to GM. Everything is dated 1953, even the jack."

Turns out, Brown is a historian and a purist. This survivor was making much more sense for him compared to the '54 in pieces that he missed out on a few weeks earlier. "I've been told this is probably the most documented early Corvette anybody has ever seen. We can literally tell the day it came out of the showroom because the delivery day is in the newspaper article as February 24, 1954, delivery day." Brown purchased the '54 directly from the grandson. Fisette was thrilled to put car and man together. **VETTE**



The seat upholstery is weathered, not real bright red like a restored car. Brown prefers the more orange color from baking in the sun for many years.

READERS' RIDES



HITTING THE TRAIL

WHO: Ron Carrieri
WHERE: Hartsville, South Carolina
WHAT: '08 Corvette

How many of us remember that moment when we knew we wanted to buy a Corvette? Well, Ron Carrieri certainly does. As he told us, "In the fall of 1962, while watching the TV show *Bonanza*, I was completely awestruck when I saw Chevrolet's newest creation; a beautiful blue split-window coupe. I was absolutely hooked on the idea of one day owning the most stunning car I'd ever seen. Fast forward 52 years and my dreams have finally come true. I am now the proud owner of an '08 3LT coupe, six-speed with 45,000 miles, heads-up display, and dual-mode exhaust. I found it on the Web and through my inexperience of online shopping, I offered thousands less than it was listed for and to my surprise the dealer accepted the offer. Needless to say I was very pleased as it has all the features I dreamed about.

"The endless articles I've read about how easily it handles mundane city driving and instantly turns into a roaring beast are completely true. I'll bet I am not alone in saying that on some nights the last thing I do before heading off to bed is to open the garage door for one last peek of my dream car." We agree that the Corvette, pick your generation, is one of the most beautiful cars to ever roll down the highway. Then again, we're more than a little biased.

FAST, LOUD, AND PROUD

WHO: Chris and Paula White
WHERE: Avon, Indiana
WHAT: '04 Corvette

Who here knows the exact moment their car was built? Well, Chris and Paula White do. As they told us, "Our C5 was born on April 23 at 6:20 a.m. and we are the second owner, with the first being a GM executive out of Michigan. Over the past five years we've transformed the BLKBOTI (Black Bow Tie) into what a midyear would look like on a C5 platform. Everything from the big-block Stinger hood to the rake of 19x10 rears and 18x9 fronts was changed to nail just the right look." To get the car sounding as menacing as it looked they swapped to a "loudmouth" exhaust and really enjoy hitting the open road and cruising to the local shows.

REPLACEMENT RIDE

WHO: John Fahlstrom and Julia Lazartic
WHERE: Longmont, Colorado
WHAT: '58 Corvette

It all started innocently enough, with the sale of a '69 Datsun 2000 Sport Roadster. You see, it was sold to fund a second garage and once that structure was up the couple needed something to park in it. "Julia saw a TV commercial that had an early Corvette in it, and said that a Corvette like that could replace 'her' Datsun," recalled John. Well, it took 13 years, but a beautiful '58 is now parked proudly in place of the Datsun. John went on to tell us, "The body was in bad shape when all the paint was removed, but with a lot of passion and work it was restored to its original condition. I wanted something that would cruise the highways and the mountain roads in Colorado. So the chassis received a full Jim Meyer Racing suspension front and four-link rear. The Corvette is powered by a 405hp, 355-inch small-block backed up by a five-speed transmission. Other options include a positraction rearend and four-wheel power disc brakes." We're pretty sure Julia is happy with "her" replacement car.

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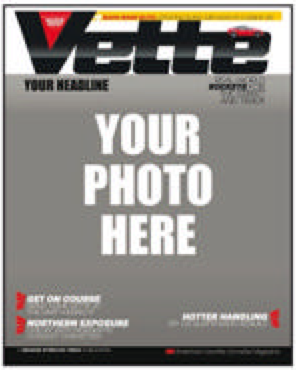

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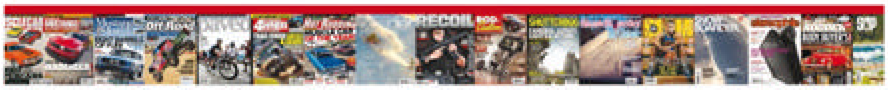

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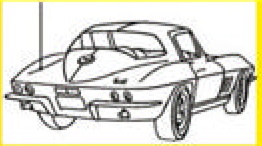
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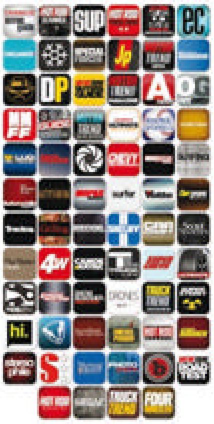

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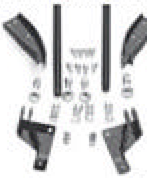

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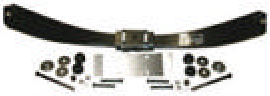

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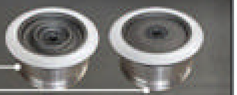

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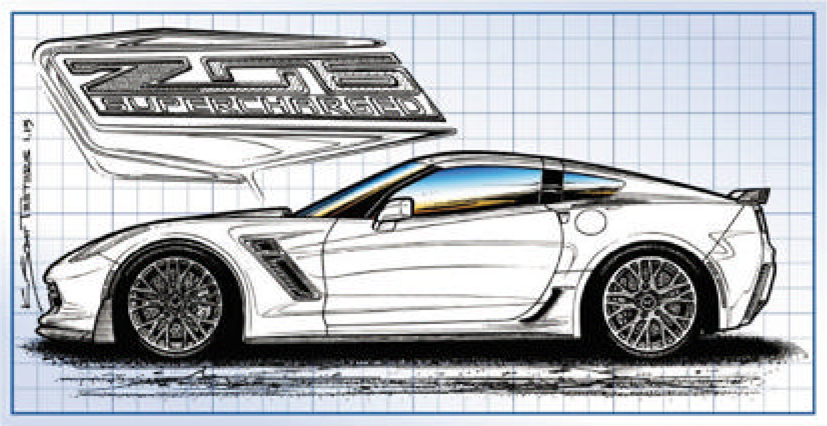

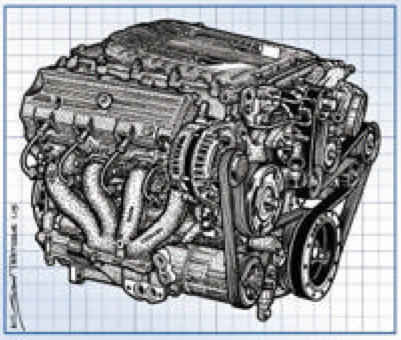

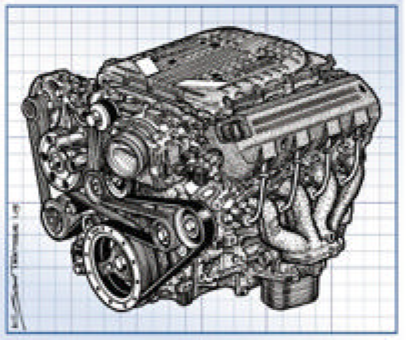

Beginning in 1963, there were only two Corvette models: the coupe and convertible. The big-blocks came along in 1965 and by 1969 buyers had seven engine options over the base 327/300, including the ZL1. Fast-forward to 2010 and buyers had six models to choose from, with the stout 430hp LS3 for the coupe, convertible, and Grand Sport coupe and convertible; the 505hp LS7 for the Z06; and the 638hp LS9 for the ZR1. That's a tough act to follow, but so far, the C7 is showing us it's got plenty of mojo.

The new LT1 is different enough from the LS3 to be considered GM's Gen V SBC. While some enthusiasts get frustrated because GM almost never does anything "revolutionary" with their engines, their "evolutionary" method is working well.

Minutes after the C7 made its debut, fans asked, "Where's the Z06?" Well, Z06s are on the road now and they're "OMG!!!" machines. Packing an LT4 engine with 650 hp and 650 lb-ft of torque, enhanced suspension, tires, brakes, and full-out, race-track-proven ground effects, the new Z06 slams everything that came before. Where the C6 Z06 was a beast at the limit, the C7 Z06 is predictable and controlled. Where the C6 Z06 was somewhat floaty at top speed, the C7 Z06 is glued to the pavement, but won't have a higher top speed because of the wind drag from the ground effects.

How did Corvette engineers pull this off based on the new LT1? The sum of the parts equals the whole. Little improvements here and there, plus a smaller, more efficient supercharger did the trick. Suffice to say that the LT4 is like a classic SBC from the past—lots of red meat left to exploit. Here are the highlights. It's not just the numbers. Yes, the LT4 delivers more horsepower and torque than the LS9, but not that much more. However, the LT4's peak torque comes in 1,500 rpm earlier than the LS9's, giving the Z06 a stronger, wider powerband. This, coupled with improved suspension, tires, and brakes, makes the C7 Z06 a complete system.

The block and crankshaft are the same as the LT1's, except for a few minor enhancements for durability, and the oil system has been improved slightly. The LT1 and LT4 heads were developed together with their combustion chambers designed digitally before being cast in aluminum. The heads flow better than the LS9's and are designed so that the burn starts in the center of the chamber. Compression for the LT4 is 10.0:1, compared to the LT1's 11.5:1. The valve angles are the same for both engines, however, there's slightly more exhaust lift for the LT4, and the LT4 has unique valves, seats, and composition. The lubrication system functions at two rates: 44-58 psi at normal operation and 65-72 psi under load. Plus, the oil pan has a cooler with 20 percent more cross section. The higher-flowing fuel pump delivers 2,900 psi into each fuel rail versus 2,175 in the LT1 (a 26 percent increase).

Because of safety considerations, the supercharger-intercooler unit had to be 3 inches shorter. Engineers accomplished this by using smaller diameter and longer rotors, allowing the intercoolers to be placed between the rotors and rocker covers. The intercooler has 50 percent more cooling fins and a volumetric efficiency of 92 percent, versus 89 percent efficiency for the LS9. While the LT4's rotors have less displacement, the small diameter allowed them to spin at 20,150 rpm, versus the LS9's 15,080 rpm, and the smaller rotors needed less torque to drive them. Overall, the LT4's supercharger system is 20 pounds lighter.

And that's the Cliff Notes version of the C7 Z06's LT4 engine. Early versions were pulling 680 lb-ft of torque. A little exhaust, camshaft, and chip work and 700-plus is reasonable. This is just the beginning; wait till the aftermarket gets a hold of the LT4. Will there be a ZR1 version or will we have to wait for the mid-engine C8? We'll see! **VETTE**

K. Scott Teeters

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